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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,  
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A DESCRIPTION of all the Countries, Cities, principal Mountains, Seas, Rivers, &c. throughout the World;  
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AND  
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from the earliest ages down to the present times.

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

VOL. VI.  
DIA—ETH  

INDOCTI DISCANT, ET AMEN MEMENTISS PERITI.  

PHILADELPHIA:  
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The names of oriental and occidental, given by jewelers to this and all other precious stones, have a different meaning from the obvious sense; the finest and hardest being always called oriental, whether they be produced in the east or not. Those called occidental are of inferior value; but according to Mr. Jeffreys, who has written a treatise on the subject, the diamonds of Brazil equal the finest oriental ones. The art of cutting these gems was invented in 1476 by Louis de Berquin a native of Bruges in the Austrian Netherlands. This stone becomes luminous in the dark, by exposure during a certain time to the rays of the sun; by heating it in a crucible; by plunging it in boiling water; or by rubbing it with a piece of glass. By friction it acquires an electrical property, by which it attracts the substance used for foils called black mastic, and other light matters. The author of the Chemical Dictionary says, that diamonds are refractory in the fire, and even apyrous. Nevertheless, experiments have been made, which prove that diamonds are capable of being diffipated, not only by the collected heat of the sun, but also by the heat of a furnace. Mr. Boyle says, that he perceived certain acid and penetrating exhalations from diamonds exposed to fire. A diamond by exposure to a concave speculum, the diameter of which was 40 inches, was reduced to an eighth part of its weight.* In the Giornale de Letterati d'Italia, vol. * Phil. VII. art. 9, we may read a relation of experiments made on precious stones, by order of the grand duke of Tuscany, with a burning lens, the diameter of which was two thirds of a Florentine ell, near the focus of which was placed another smaller lens. By these experiments we find, that diamonds were more altered by solar heat than most of the other precious stones, although not the least appearance of a commencing fusion was observable. A diamond weighing 30 grains, thus exposed during 30 seconds, lost its colour, lustre, and transparency, and became of an opaque white. In five minutes, bubbles appeared upon its surface; soon afterwards it burst into pieces, which were diffipated; and the small fragment which remained was capable of being crushed into fine powder by the pressure of the blade of a knife. Neither the addition of glafs, fibles, sulphur, metals, or salt of tartar, prevented this diminution.

Vol. VI.
Diamond.

Diamonds were found to have the property which he supposes may be the same as that by which this substance defends metals from destruction by fire. He was confirmed in his opinion, by observing that diamonds were not preferred from the action of fire by surrounding them with powder of chalk and of calcined hartshorn, and including them in clothe vessels, so well as when the charcoal had been employed. Some chemists even thought that the perfect exclusion of air alone was sufficient to preserve diamonds, and doubted whether the balls and crucibles of porcelain employed by M. D'Arcet had excluded the air with sufficient accuracy. Indeed, in one of M. D'Arcet's own experiments, a diamond included in a ball of porcelain had resisted the action of fire. In order to ascertain this question, M. Cadet exposed diamonds in covered and luted crucibles to the violent heat of a forge during two hours; by which operation the diamonds lost only \( \frac{1}{10} \)th part of their weight. He infers, that the destruction of the diamonds by fire in open vessels is not a true volatilization; but merely an exfoliation, caused by the fire expanding the air contained between the thin plates of which these stones consist, and that by this exfoliation or decrepitation these plates are reduced to a fine powder as to escape observation. M. D'Arcet objected against the experiments of his adversaries, that they were not of sufficient duration to decide against his, which had lasted several days. He renewed and multiplied his experiments, which confirmed him in his opinion of the volatilization of diamonds in vessels perfectly closed; and that this effect of fire on diamonds is not a mere exfoliation or mechanical separation of the plates of which these stones consist, he infers from the parts of the diamonds pervading the mostf solid porcelain crucibles without being perceptible, and from the luminous appearance first noticed by M. Macquer, and which was afterwards observed by M. Roux to be an actual flame.

Diamonds are found only in the East Indies, and in Brazil in South America. The diamond mines are found only in the kingdoms of Golconda, Vifapour, Bengal, and the Island of Borneo. There are four mines, or rather two mines and two rivers, whence diamonds are drawn. The mines are, 1. That of Ralconda, in the province of Carnatica, five days journey from Golconda, and eight from Vifapour. It has been discovered about 200 years. 2. That of Gani, or Coalur, seven days journey from Golconda eastwardly. It was discovered 140 years ago by a peasant, who digging in the ground found a natural fragment of 35 carats. 3. That of Soumepoar, a large town in the kingdom of Bengal, near the Diamond-mine. This is the most ancient of them all: it should rather be called that of Goul, which is the name of the river, in the land whereof these stones are found. Lastly, the fourth mine, or rather the second river, is that of Sucudan, in the island of Borneo.

Diamond-Mine of Ralconda.—In the neighborhood of this mine the earth is sandy, and full of rocks and cope. In these rocks are found several little veins of half and sometimes a whole inch broad, out of which the miners, with a kind of hooked iron, draw the sand or earth wherein the diamonds are; breaking the rocks when the vein terminates, that the track may be found again and continued. When a sufficient quantity of earth or sand is drawn forth they wash it two or three times, to separate the stones therefrom.
Diamond-Mine of Gani or Coulour.—In this mine are found a great number of stones from 10 to 40 carats, and even more; and it was here that famous diamond of Aurung-Zeb the Great Mogul, which before it was cut weighed 739 carats, was found. The stones of this mine are not very clear; their water is usually tinged with the quality of the soil, being black where that is marly, red where it partakes of red, sometimes green and yellow, if the ground happen to be of those colours. Another defect of some consequence is a kind of greasiness appearing on the diamond, when cut, which takes off part of its lustre. —There are usually no less than 60,000 persons, men, women, and children, at work in this mine.

When the miners have found a place where they intend to work, they level another wall near the neighbourhood thereof, and enclose it with walls about two feet high, only leaving apertures from space to space, to give passage to the water. After a few superstitious ceremonies, and a kind of feast which the master of the mine makes for the workmen, to encourage them, every one goes to his business, the men digging the earth in the place first discovered, and the women and children carrying it off into the other walled round. They dig 12 or 14 feet deep, and till such time as they find water. Then they cease digging; and the water thus found serves to wash the earth two or three times, after which it is let out at an aperture reserved for that end. This earth being well washed, and well dried, they sift it in a kind of open sieve, or riddle, much as they do corn in Europe: then thrash it, and sift it afresh; and lastly, search it well with the hands to find the diamonds. They work naked as in the mine of Raolconda, and are watched after the like manner by inspectors.

Diamond-Mine of Soumepour, or river Gousal.—Soumepour is a large town built all of earth, and covered with branches of cacao-trees; the river Gousal runs by the foot thereof, in its pasing from the high mountains towards the south to the Ganges, where it loses its name. It is from this river that all our fine diamond points, or sparks, called natural sparks, are brought. They never begin to seek for diamonds in this river till after the great rains are over, that is, after the month of December; and they usually even wait till the water is grown clear, which is not before January. The feafoil at hand, eight or ten thousand persons, of all ages and sexes, come out of Soumepour and the neighbouring villages. The most experienced among them search and examine the find of the river, going up from Soumepour to the very mountain whence it springs. A great sight that there are diamonds in it is the finding of these stones which the Europeans call thunder-stones. When all the find of the river, which at that time is very low, has been well examined, they proceed to take up that where in they judge diamonds likely to be found: which is done after the following manner: They dam the place round with flowers, earth, and sediments, and laying out the water, dig about two feet deep; the sand thus got is carried into a place walled round on the bank of the river. The work is performed after the same manner as at Coulour, and the workmen are watched with equal strictness.

Diamond-Mine in the island of Borneo, or river of Succedan.—We are but little acquainted with this latter mine; the queen who reigns in that part of the island does not allow strangers to have any commerce in these stones; though there are very fine ones to be bought at Batavia, brought thither by stealth. They were anciently imagined to be softer than those of the other mines; but experience shows they are in no respect inferior to them.

Belide the four diamond-mines, there have been two others discovered; one of them between Coulour and Raolconda, and the other in the province of Carnatica; but they were both closed up almost as soon as discovered: that of Carnatica, because the water of the diamonds was always either black or yellow; and the other, on account of their cracking, and flying in pieces when cut and grained.

The diamond, we have already observed, is the hardest of all precious stones. It can only be cut and ground by itself and its own substance. To bring it to that perfection which augments its price so considerably, they begin by rubbing several times the diamond dust with water as to render it very fine, and then taking that which turns a wheel of soft iron sprinkled over it, they begin by rubbing several times the diamond dust, after having first glued them to the ends of two wooden blocks, thick enough to be held in the hand. It is this powder thus rubbed off the stones, and received in a little box for the purpose that serves to grind and polish the stones.

Diamonds are cut and polished by means of a mill, which turns a wheel of soft iron sprinkled over which diamond-duft mixed with oil of olives. The fame duft, well ground, and diluted with water and vinegar, is used in the sawing of diamonds: which is performed with an iron or brass wire, as fine as a hair. Sometimes, in lieu of fawing the diamonds, they cleave them, especially if there be any large shivers therein. But the Europeans are not usually daring or expert enough to run the risk of cleaving, for fear of breaking.

The first water in diamonds means the greatest purity and perfection of their composition, which ought to be that of the purest water. When diamonds fall short of this perfection, they are said to be of the second or third water, and these stones are either called coloured; for it would be an impropriety to speak of an imperfectly coloured diamond, or one that has other defects, as a stone of a bad water only.

Mr. Boyle has observed, from a perfon much conversant in diamonds, that some of these gems, in their rough state, were much heavier than others of the same bigness, especially if they were cloudy or foul; and Mr. Boyle mentions one that weighed 84 grains, which being carefully weighed in water, proved to an equal bulk of that liquor as 2½ to 1. So that, as far as could be judged by that experiment, a diamond weighing not thrice as much as water: and yet, in his table of specific gravities, that of a diamond is said to be water as 3400 to 1000, that is, as 3½ to 1; and therefore, according to these two accounts, there should be some diamonds whose specific gravity differs nearly from that of others. But this is a much greater di
For instance, than can be expected in two bodies of the same species; and indeed, on an accurate trial, does not prove to be the case with diamonds. The Brazil diamonds differ a little in weight one from another, and greatly vary from the standard set by Mr. Boyle for the specific gravity of this gem in general; two large diamonds from that part of the world being carefully weighed, one was found as 3518, the other as 3521, the specific gravity of water being reckoned 1000.

After this, ten East India diamonds were chosen out of a large parcel, each as different as from the other in shape, colour, &c. as could be found. These being weighed in the same scales and water with the former, the lightest proved as 3512, the heaviest as 3525, still supposing the water to be 1000. Mr. Eliot, who made these experiments, has drawn out a table of their several differences, which is done with great care and accuracy; and, taking in all the common varieties in diamonds, may serve as a general rule for their mean gravity and differences.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Grain</th>
<th>Grain</th>
<th>Specific Gravity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A Brazil diamond, fine</td>
<td>92,425</td>
<td>66,16</td>
<td>3518</td>
</tr>
<tr>
<td>2</td>
<td>Ditto, fine water, rough</td>
<td>88,21</td>
<td>63,16</td>
<td>3521</td>
</tr>
<tr>
<td>3</td>
<td>Ditto, fine bright coat</td>
<td>10,023</td>
<td>7,170</td>
<td>3511</td>
</tr>
<tr>
<td>4</td>
<td>Ditto, fine bright coat</td>
<td>9,560</td>
<td>6,830</td>
<td>3501</td>
</tr>
<tr>
<td>5</td>
<td>An East India diamond, pale</td>
<td>26,485</td>
<td>18,945</td>
<td>3512</td>
</tr>
<tr>
<td>6</td>
<td>Ditto, bright yellow</td>
<td>23,333</td>
<td>16,710</td>
<td>3524</td>
</tr>
<tr>
<td>7</td>
<td>Ditto, very fine water,</td>
<td>20,66</td>
<td>14,800</td>
<td>3525</td>
</tr>
<tr>
<td>8</td>
<td>Ditto, very bad water,</td>
<td>20,38</td>
<td>14,590</td>
<td>3519</td>
</tr>
<tr>
<td>9</td>
<td>Ditto, very hard blue cast</td>
<td>22,5</td>
<td>16,1</td>
<td>3515</td>
</tr>
<tr>
<td>10</td>
<td>Ditto, very soft, good water</td>
<td>22,615</td>
<td>16,2</td>
<td>3525</td>
</tr>
<tr>
<td>11</td>
<td>Ditto, a very large red</td>
<td>25,80</td>
<td>18,230</td>
<td>3514</td>
</tr>
<tr>
<td>12</td>
<td>Ditto, soft, bad water</td>
<td>29,525</td>
<td>21,140</td>
<td>3521</td>
</tr>
<tr>
<td>13</td>
<td>Ditto, soft, brown coat</td>
<td>25,253</td>
<td>18,990</td>
<td>3516</td>
</tr>
<tr>
<td>14</td>
<td>Ditto, very deep green</td>
<td>25,250</td>
<td>18,680</td>
<td>3521</td>
</tr>
</tbody>
</table>

The mean specific gravity of the Brazil diamonds appears to be 3513.

Of the East India diamonds: mean of both 3517.

Therefore, in any thing to be concluded as to the specific gravity of the diamond, it is, that it is to water as 3517 to 1000.

For the valuation of diamonds of all weights, Mr. Jeffries lays down the following rule. He first supposes the value of a rough diamond to be settled at 21 per carat, at a medium; then to find the value of diamonds of greater weights, multiply the square of their weight by 2, and the product is the value required.

E. G. to find the value of a rough diamond of two carats, $2 \times 2 = 4$, the square of the weight; which, multiplied by 2, gives 8, the true value of a rough diamond of two carats. For finding the value of manufactured diamonds, he supposes half their weight to be lost in manufacturing them; and therefore, to find their value, we must multiply the square of double their weight by 2, which will give their true value in pounds.

Thus, to find the value of a wrought diamond weighing two carats; we first find the square of double the weight, i.e. $4 \times 2 = 8$; then $8 + 2 = 10$. So that the true value of a wrought diamond of two carats is 10.

On these principles Mr. Jeffries has constructed tables of the price of diamonds from 1 to 100 carats.

The greatest diamond ever known in the world is one belonging to the king of Portugal, which was found in Brazil. It is still uncut: and Mr. Magellan informs us, that it was of a larger size; but a piece was cleaved or broken off by the ignorant countryman, who chanced to find this great gem, and tried its hardness by the stroke of a large hammer upon the anvil.

This prodigious diamond weighs 1680 carats: and although it is uncarr, Mr. Rome de l'Ile says, that it is valued at 224 millions sterling; which gives the estimation of 79,36 or about 458 pounds sterling for each carat: viz. for the multiplicaad of the square of its whole weight. But even in case of any error of the price in this valuation, if we employ the general rule abovementioned, this great gem must be worth at least 5,644,800 pounds sterling, which are the product of 1680 by two pounds, viz. much above five millions and a half sterling.

The famous diamond which adorns the sceptre of the Empress of Russia under the eagle at the top of it weighs 779 carats, and is worth at least 224 millions sterling; which gives the estimation of 79,36 or about 389 pounds sterling for each carat: viz. for the multiplicaad of the square of its whole weight. It is not in the possession of Prince Orloff, who had deserted from the Indian service, contrived so well as to become one of the priests of that idol, from which he had the opportunity to steal its eye: he ran away to the English at Trichinapetty, and thence to Madras. A hired-baptist bought it for twenty thousand rupees: afterwards a Jew gave seventeen or eighteen thousand pounds sterling for it: at last a Greek merchant, named Gregory Sturfa, offered it to sale at Amsterdam in the year 1766: and the late prince Orloff made this acquisition, as he himself told Mr. Magellan in London, for his sovereign the empress of Russia. Dutens, page 19, and Bomar, page 389, of his Mineralogy, relate the above anecdote. The figure and size of this diamond may be seen in the British Museum in London: it is far from being of a regular form.

The diamond of the great Mogul is cut in Rofe; weighs 279½ carats, and is worth 380,000 guineas. This diamond has a small flaw underneath near the bottom: and Tavernier, page 389, who examined it, valued the carat at 150 French livres. Before this diamond was cut, it weighed 793½ carats, according to Rome de l'Ile; but Tavernier, page 339 of his second volume, says, that it weighed 900 carats before it was cut. If this is the very same diamond, its loss by being cut was very extraordinary.

Another diamond of the king of Portugal, which weighs 215 carats, is extremely fine, and is worth at least 269,800 guineas.

The diamond of the grand duke of Tuscany, now of the emperor of Germany, weighs 139½ carats: and is worth at least 105,520 guineas. Tavernier says that
that this diamond has a little hue of a citron colour; and he valued it at 135 livres tournois the carat.

Robert de Berquen says, that this diamond was cut into two: that the grand Turk had another of the same size; and that there were at Biftagier two large diamonds, one of 250 and another of 140 carats.

This Robert de Berquen was the grandson of Louis de Berquen, who invented the art of cutting diamonds.

The diamond of the king of France, called the Pitt or Regent, weighs 156 carats: this gem is worth at least 208,333 guineas, although it did not cost above the half of this value.

The other diamond of the same monarch, called the Sancy, weighs 55 carats; it cost 25,000 guineas; and Mr Dutens says, that it is worth much above that price.

Diamond, that is cut in faces both at top and bottom; and whole table, or principal face at top, is flat. To make a complete square brilliant, if the rough diamond be not found of a square figure, it must be made so; and if the work is perfectly executed, the length of the axis will be equal to the side of the square base of the pyramid. — Jewellers then form the table and collet by dividing the block, or length of the axis into 18 parts. They take $\frac{1}{3}$ from the upper part, and $\frac{1}{18}$ from the lower. This gives a plane at $\frac{1}{3}$ distance from the girdle for the table; and a smaller plane at $\frac{1}{18}$ distance for the collet; the breadth of which will be $\frac{1}{3}$ of the breadth of the table. In this flute the stone is held to be a complete square table diamond. — The brilliant is an improvement on the table-diamond, and was introduced within the last century, according to Mr Jefferys. — To render a brilliant perfect, each corner of the above described table-diamond, must be shortened by $\frac{1}{3}$ of its original. The corner ribs of the upper sides must be flattened, or run towards the centre of the table; less than the sides; the lower part, which terminates the girdle, must be $\frac{1}{3}$ of one side of the girdle; and each corner rib of the under sides must be flattened at the top, to answer the above flattening at the girdle, and at bottom must be $\frac{1}{3}$ of each side of the collet.

The parts of the small work which completes the brilliant, or the lower and skill facets, are of the triangular figure. Both of these partake equally of the depth of the upper sides of the table to the girdle; and meet in the middle of each side of the table and girdle, as also at the corners. Thus they produce regular lozenges on the four upper sides and corners of the stone. The triangular facets, on the under sides, joining to the girdle, must be half as deep again as the above facets, to answer to the collet part. — The stone here described is said to be a full-framed brilliant. — If the stone is thicker than in the proportion here mentioned, it is said to be an over-weighted brilliant. — If the thickness is less than in this proportion, it is called a spread-brilliant. — The beauty of brilliants is diminished from their being either over-weighted or spread. The true proportion of the axis, or depth of the stone to its side, is as 2 to 3. — Brillants are distinguished into square, round, oval, and drops, from the figure of their respective girdles.

Cornell Diamond, a name given by many people to the crystals found in digging the mines of tin in Cornwall. These crystals are of the nature of the Kerry-stone of Ireland, but somewhat inferior to it: they are usually bright and clear, except towards the root, where they are coarse and foul, or whitish. They are usually found in the common form of an hexagonal column terminated at each end by an hexagonal pyramid.

Rough Diamond is one that is quite flat underneath, with its upper part cut in divers little faces, usually triangles, the uppermost of which terminate in a point. — In rofe-diamonds, the depth of the stone from the base to the point must be half the breadth of the diameter of the base of the stone. The diameter of the crown must be $\frac{1}{2}$ of the diameter of the base. The perpendicular, from the base to the crown, must be $\frac{1}{2}$ of the diameter of the stone. The lozenges which appear in all circular rofe-diamonds, will be equally divided by the ribs that form the crown; and the upper angles or facets will terminate in the extreme point of the stone, and the lower in the base or girdle.

Rough Diamond, is the stone as nature produces it in the mines.

A rough diamond must be chosen uniform, of a good shape, transparent, not quite white, and free of flaws and shivers. Black, rugged, dirty flawy, veiny stones, and all such as are not fit for cutting, they use to pound in a steel morter made for that purpose; and when pulverized, they serve to saw, cut, and polish the ref. Shivers are occasioned in diamonds by this. That the miners, to get them more easily out of the vein, which winds between two rocks, break the rocks with huge iron levers, which shakes, and fills the stone with cracks and shivers. The ancients had two mistaken notions with regard to the diamond: the first, that it became soft, by steeping it in hot goat's blood; and the second, that it is malleable, and bears the hammer. Experience shows us the contrary; there being nothing capable of mollifying the hardness of this stone; tho' its hardness be not such, that it will endure being struck at pleasure with the hammer.

Falsities Diamonds. Attempts have been made to produce artificial diamonds, but with no great successes. — These made in France, called temple diamonds, on account of the temple at Paris, where the beat of them are made, fall vastly short of the genuine ones; accordingly they are but little valued, though the consumption thereof is pretty considerable for the habits of the actors on the stage, &c. See Pastes.

Diamond, in the glaft-trade, an instrument used for squaring the large plates or pieces; and, among glaziers, for cutting their glasfs.

These sorts of diamonds are differently fitted up. That used for large pieces, as looking-glases, &c. is set in an iron ferril, about two inches long, and a quarter of an inch in diameter; the cavity of the ferril being filled up with lead, to keep the diamond firm; there is also a handle of box or ebony fitted to the ferril, for holding it by.

Diamond, in heraldry, a term used for expressing the black colour in the achievements of pears. — Guillim does not approve of blazoning the coats of peers by precious stones instead of metals and colours; but the English practice allows it. — Morgan says the diamond is an emblem of fortitude.

Diana, the goddess of hunting. According to Ciceró,
Diana

Cicero, there were three of this name: a daughter of Jupiter and Proserpine, who became mother of Cupid; a daughter of Jupiter and Latona; and a daughter of Uris and Glauce. The second is the most celebrated, and to her all the ancients allude. She was born at the same birth as Apollo; and the pains which the law her mother suffered during her labour gave her such an aversion to marriage, that she obtained of her father to live in perpetual celibacy, and to preclude the approach of women. To the nation of men, she devoted herself to hunting; and was always accompanied by a number of chosen virgins, who, like herself, abjured the use of marriage. She is represented with aquiver and attended with dogs, and sometimes drawn in a chariot by two white flags. Sometimes she appears with wings, holding a lion in one hand and a panther in the other, with a chariot drawn by two heifers, or two horses of different colours. She is represented as tall; her face has something manly; her legs are bare, well shaped, and strong; and her feet are adorned with a galloon worn by hunters among the ancients. She received many surnames, particularly from the places where her worship was established, and from the functions over which she presided. She was called Lucina, Iphitus, or Juno Promachus, when invoked by women in childbed; and Priesta when worshipped in the cross-ways, where her statues were generally erected. She was supposed to be the same with the moon, and Proserpine or Hecate, and from her with three heads, that of a horse, a female, and a dog, and a boar. Her power and functions under these three characters have been beautifully expressed in these two verses:

Torvit, hoprat, agita, Proserpina, Luna, Diana,
Less, fepehuma, feras, jorps, folges, jugitis.

She was also called Agrotata, Orithia, Taureia, Dolia,
Cynthia, Aricia, &c. She was supposed to be the same as the Isis of the Egyptians, whose worship was introduced into Greece with that of Isis under the name of Apollo. When Typhon waged war against the gods, Diana metamorphosed herself into a cat to avoid his fury. She is generally known, in the figures that represent her, by the crescent on her head, by the dogs which attend her, and by her hunting habit. The most famous of her temples was that of Ephesus, which was one of the seven wonders of the world; (See Ephesus.) She was there represented with a great number of breasts, and other symbols which inquired the earth or Cybele. Though she was the patroness of chastity, yet she forgot her dignity to enjoy the company of Endymion, and the very familiar favours which he granted to Pan and Orion are well known: (See Endymion, Pan, Orion.) The inhabitants of Taureia were particularly attached to the worship of this goddess, and they cruelly offered on her altar all the strangers that were shipwrecked on their coasts. Her temple in Aricia was served by a priest who had always murdered his predecessor; and the Lacedemonians yearly offered her human victims till the age of Lycurgus, who changed this barbarous custom for the sacrifice of Magellans. The Athenians generally offered her grapes; and others a white kid, and sometimes a boar pig or an ox. Among plants, the poppy and the diany were dedicated to her. She, as well as her brother Apollo, had some oracles; among which those of Egypt, Cilicia, and Ephesus, are the most known. Dixan, or Arbor Luna, in chemistry, the beautiful crystallizations of silver, diluted in aquafortis, to which some quicksilver is added; and do called from their resembling the trunk, branches leaves, &c. of a tree. See Chemistry, no 754.

Diana Fanum, (anc. geog.) a promontory of Bithynia: Now Scutari, a citadel opposite to Constantinople, on the east side of the Bosphorus Thracicus.

Diana Portus, a port of Corica, situated between Aleria and Mariania, on the east side.

Dianthus (from dies, twice, and an, a man), the name of the second class in Linnaeus's sexual system, consisting of hermaphrodite plants; which, as the name imports, have flowers with two stamens or male organs.

The orders in this class are three, derived from the number of styles or female parts. Most plants with two stamens have one style; as jessamine, lilac, privet, veronica, and balsam alternata: venral grafts have two styles; pepper, three.

Dianium (anc. geog.), a town of the Constana, in the Hither Spain; famous for a temple of Diana, whence the name: Now Deua, a small town of Valencia, on the Mediterranean. Also a promontory near Dianium: Now En Cabo Martin, four leagues from Denia, running out into the Mediterranean.

Diantherra, in botany: A genus of the monogynia order, belonging to the diandria class of plants; and in the natural method ranking under the 40th order Perisoneae. The corolla is ringent; the capsule bilocular, parting at the base; the flower each furnished with two anthers placed alternately. — There is only one species, a native of Vir­ginia and other parts of North America. It is a low herbaceous plant, with a perennial root, sending out upright stalks a foot high, garnished with long narrow leaves of an aromatic odour, standing close to the stalks. From the side of the stalks the tootstalks of the flowers are produced, fultaining small spikes of flowers. — This plant is very difficult to preserve in Britain; for though it is hardy enough to live in the open air, it is very subject to rot in winter. It may be propagated by seeds sown on a gentle hot-bed; and in the winter the plants must be kept in a dry flowe.

Dianthus, clove gilliflower, carination pine, sweet-William, &c.: A genus of the monogynia order, belonging to the decandria class of plants; and in the natural method ranking under the 22d order Caryophyllae. The calyx is cylindrical and monophyllous, with four scales at the base. There are five petals, with narrow heels; the capsule is cylindrical and unilocular. — There are great number of species: but not more than four that have any considerable beauty as garden-flowers, each of which furnishes some beautiful varieties. 1. The Caryophyllus, or clove-gilliflower including all the varieties of carination. It rifes with many short trailing shoots from the root, garnished with long, very narrow, evergreen leaves; and amidst them upright slender flower-stalks, from one to three feet high, emitting many side-shoots; all of which, as well as the main stalk, are terminated by large solitary flowers, having short oval scales to the calyx, and crested petals. The varieties of this are very numer­ous,
Dianthus. The delphinium, or common pink, rises with numerous short leafy shoots crowning the root, in a rooted bed close to the ground, closely garnished with small narrow leaves, and from the ends of the shoots many erect flower-stalks, about six to 15 inches high, terminated by solitary flowers of different colours, single and double, and sometimes finely variegated. This species is perennial, as all the varieties of it commonly cultivated also are. 2. The Chinesis, China or Indian pink, is an annual plant with upright firm flower-stalks, branching erect on every side, a foot or 15 inches high, having all the branches terminated by solitary flowers of different colours and variegations, appearing from July to November. 3. The barbatus, or bearded dianthus, commonly called *fucet William*. This rises with many thick leafy shoots, crowning the root in a clustered close to the ground; garnished with spear-shaped evergreen leaves, from half an inch to two inches broad. The stems are upright and firm, branching erect two or three feet high, having all the branches and main stem crowned by numerous flowers in aggregate clusters of different colours and variegations.

Although the carnations grow freely in almost any garden earth, and in it produce beautiful flowers, yet they are generally superior in that of a light loamy nature: and of this kind of soil the planters must be especially particular. The only certain method of propagating the double varieties is by layers. The proper parts for layers are those leafy shoots arising near the crown of the root, which, when about five, six, or eight inches long, are of a proper degree of growth for layers. The general season for this work is June, July, and the beginning of August, when the shoots will be arrived at a proper growth for that operation; and the sooner it is done after the shoots are ready the better, as that they may have sufficient time to acquire strength before winter: these laid in June and July will be fit to take off in August and September, and will form fine plants in the month of October. The method of performing the work is as follows. First, provide a quantity of small hooked picks for pegs. They must be three or four inches long, and their use is to peg the layers down to the ground. Get ready also in a barrel a quantity of light rich mould, to raise the earth, if necessary, round each plant, and provide a sharp penknife. The work is begun by stripping off all the leaves from the body of the shoots, and shortening those at top an inch or two evenly. Then choosing a strong joint on the middle of the shoot or thereabouts, and on the back or under side thereof, cut with the penknife the joint half-way through, directing your knife upward so as to split the joint up the middle, almost to the next joint above, by which you form a kind of tongue on the back of the shoot; observing that the swelling skinny part of the joint remaining at the bottom of the tongue must be trimmed off, that nothing may obstruct the inflowing of the fibres; for the layers always form their roots at that part. This done, loosen the earth about the plant; and, if necessary, add from fresh mould, to raise it for the more ready reception of the layers: then with your finger make a hollow or drill in the earth to receive the layer; which bend horizontally into the opening, raising the top upright, so as to keep the green or slit part of the layer open; and, with one of the hooked picks, peg down the body of the layer, to secure it in its proper place and position, still preserving the top erect and the slit open, and draw the earth over it an inch or two, bringing it close about the erect part of the shoot; and when all the shoots of each plant are thus laid, give directly some water to settle the earth close, and the work is finished. In dry weather the waterings must be often repeated, and in five or six weeks the layers will have formed good roots. They must then be separated with a knife from the old plant, gently raised out of the earth with the point of a knife or trowel, in order to preserve the fibrous roots of the layers as entire.
when the voice proceeds from the first to the twelfth found.

**Diapason Diatessaron**, in music, a compound concord founded on the proportion of 8 to 3. To this interval Martianus Capella allows 8 tones and 1 semitone, 17 femitones, and 34 dies. This is when the voice proceeds from its first to its eleventh found. The moderns would rather call it the eleventh.

**Diapason Ditone**, in music, a compound concord, whose terms are as 10-4, or 18-3.

**Diapason Semiditone**, in music, a compound concord, whose terms are in the proportion of 12-5.

**DIA PESIS**, in medicine, a transfusion of the fluids through the sides of the vessels that contain them, occasioned by the blood's becoming too much attenuated, or the pores becoming too patent.

**Diapente**, in the ancient music, an interval marking the second of the concords, and with the diapason an octave. This is what in the modern music is called a fifth.

**Diaphanous**, an appellation given to all transparent bodies, or such as transmit the rays of light.

**Diaphoresis**, in medicine, an elimination of the humours in any part of the body through the pores of the skin. See Perpiration.

**Diaphoretics**, among physicians, all medicines which promote perspiration.

**Diaphragm, Diaphragma**, in anatomy, a part popularly called the midriff, and by anatomists septum transversum. It is a nervous muscle, separating the breast or thorax from the abdomen or lower venter, and serving as a partition between the natural and the vital parts, as they are called. See Anatomy, no. 111.

It was Plato, as Galen informs us, that first called it diaphragm, from the verb περιπτειναι, to separate or be between two. Till his time it had been called φθόνος, from a notion that an inflammation of this part produced phrensy; which is not at all warranted by experience, any more than that other tradition, that a transforms of the diaphragm with a sword causes the patient to die laughing.

**Diaporesis, Diaporesis**, in rhetoric, is used to express the hesitation or uncertainty of the speaker.

We have an example in Homer, where Ulysses, going to relate his sufferings to Alcinous, begins thus:

τί πρῶτον, τί δε δεύτερον, τί δε τρίτον εκθέτειν; Quid primum, quid deinde, quid tertium adducere?

This figure is most naturally placed in the exordium or introduction to a discourse. See Doubting.

**Diarbeck, or Diarberk**, an extensive province of Eastern Asia, Turkey; comprehending, in its latest extent, Diarbeck, properly so called, Turan or Chaldia, and Curdi, which were the ancient countries of Melopotamia, Chaldea, and Assyria, with Byblon. It is called Diarbeck, Dierbeck, or Dierbak, as signifying the "duke's country," from the word Ṯ ayr "a duke, and ber "country." It extends along the banks of the Euphrates and Tigris from north-northwest to south-east, that is, from Mount Taurus, which divides it from Turcomania on the north, to the innermost recesses of the Persian Gulf on the south, about 600 miles; and from east to west, that is, from Peria on the east to Syria and Arabia Felix on the west, in some places 200, and in others about 300, miles, but
but in the southerly or lower parts not above 15°. As extending also from the 30th to the 38th degree of latitude, it lies under part of the fifth and sixth climates whose longest day is about 14 hours and a half, and so in proportion, and consequently enjoys a good temperature of air, as well as, in the greater part of it, a rich and fertile soil. There are indeed, as in all hot countries, some large deserts in it, which produce no sustenance for men or cattle, nor have any inhabitants. Being a considerable frontier towards the kingdom of Persia, it is very well guarded and fortified; but as for those many cities once so renowned for their greatness and opulence, they are at present almost dwindled into heaps of ruins. Bagdad, Moful, Carahmed, and a few more, indeed continue to be populous and wealthy; but the rest can scarce be called by any other name than that of forty places. The rivers Euphrates and Tigris have almost their whole course through this country.

Diarbekk Proper is bounded on the north by Turco-mania, on the west by Syria, on the south by part of Arabia Deferta and Yrack Proper, and on the east by Curdiitam. It was named by Moses Padan Aram; the latter being the general name of Syria; and the former signifying fruitful, a proper epithet for this country, which is really to a very high degree, especially on the northern side, where it yields corn, wine, oil, fruits, and all necessaries of life in great abundance. Formerly it was the residence of many famed patriarchs, yet was over-run with the grovel idolatry, not only in the time of Abraham's coming out of it, and Jacob's fouling in it, but likewise during the time it continued under the dominion of the Assyrians, Babylonians, Medes, Persians, and Romans. It received indeed the light of the gospel soon after our Saviour's ascension, from St Thaddeus, who is said to have been sent thither by St Thomas, at the request of Agbaras king of Edefa. This account, together with that monarch's letter to Jefus Christ, we have from Eusebius, who took it from the archives of that city; and the whole had passed current and uncontradicted for many ages, till our more enlightened moderns found reasons to condemn it; but whether right or wrong, it plainly appears that Christianity flourished here in a most eminent manner, till its purity was deftroyed by the heresy of the Jacobites, whose patriarch still resides here, with a jurisdiction over all that is in the Turkish dominions.

Diarbekk Proper, is a beglerbegate, under which are reckoned twelve fanqiacs; and the principal towns in it are, Diarbekir or Caramed, Rika, Mousful, Orfa or Edessa, Elbir, Nifihib, Gazir Merdin, Zibin, Ur of the Chaldees, Amad, and Carasara; but all now of little note excepting Diarbekir and Mousful.

Diarbekir, the capital of the above diocritre, is situated in a delightful plain on the banks and near the head of the Tigris, about 155 miles or 15 caravans days journey, north-east from Aleppo, in latitude 39° 37', and longitude 40° 50'. The bridge of 10 arches over the said river is said to have been built by the order of Alexander the Great. It is one of the richest and most mercantile cities in all Asiatic Turkey; and is well fortified, being encompassed with a double wall, the outermost of which is flanked, with 72 towers; said to have been raised in memory of our Saviour's 72 disciples. It has several lately piazzas or market-places, well flored with all kinds of rich merchandise, and 12 magnificent mosques, said to have been formerly Christian churches. Its chief manufacture is the dressing, tanning, and dyeing of goat-skins, commonly called Turkey leather, of which the vent is almost incredible in many parts of Europe and Asia: besides this, there is another of dyed fine linen and cotton cloths, which are nearly in the same request. The waters of the Tigris are reckoned extraordinary for those two branches of trade, and give red leather a finer grain and colour than any other. There is a good number of large and convenient inns on both sides of the river, for the caravans that go to and from Persia; and on the road near the town is a chapel with a cupola, where Job is said to lie buried. This place is much frequented by pilgrims of all nations and religions, and a Turkish hermit has a cell close to it. The fair fex, who, in most other parts of the Turkish empire, are kept quite immured and considered as mere slaves, enjoy here an extraordinary liberty, and are commonly seen on the public walks of the city in company with the Christian women, and live in great friendship and familiarity with them. The same is said of the men, who are police, affable, and courteous, and very different from what they affect to be, especially the Turks, in other cities of this empire. The city is under the government of a basha, who has great power and very large dominions. He has commonly a body of 20,000 horse under him, for repelling the frequent incursions of the Curdiitans and Tartars, who always go on horseback to rob the caravans. The adjacent territory is very rich and beautiful; the bread, wine, and flesh excellent; the fruits exquisite, and the pigeons better and larger than any in Europe.

Mr Ives, who passed through this city in 1758, informs us, that about two years ago it was very populous, its inhabitants amounting to 400,000 souls, but in the last year 300,000 died either by cold or famine. The Christians residing in the city before this calamity were reckoned to amount to 26,000, of whom 20,000 died. This account we had from one of the French millionaries, a capuchin, who also said, that before the famine the city contained 60,000 fighting men, but that now they are able to muster 10,000. He affirms us, that the houses and streets, nay the very mosques, were filled with dead; that every part of the city exhibited a dreadful image of death; and that the surviving inhabitants not only greedily devoured all kinds of beasts, brutes, and reptiles, but also were obliged to feed on human bodies. Yet, in the midst of this scene of horror, the grandees of the city had every thing in plenty; for they had taken care to monopolize vast quantities of corn, which they sold out to the other inhabitants at most extravagant prices, and thereby acquired for themselves immense fortunes. Corn rose from two piastres a measure to 50, 60, and even 70, in the space of six months. The father added, that the very severe winter of 1756, and the locusts in 1757, were the causes of this dreadful visitation: for by reason of the former, there were but few acres of land sown with corn; and by the latter, the small crop they had was in a great measure destroyed. He spoke of the severity of that winter in terms almost incredible: that it was common to fee the
people fall down dead in the streets; that he himself
once on quitting a warm room, and going into the
open air, fell down motionless; and that his brother, in
attempting to assist him, met with the same fate." 
This account of the effects of cold in the city of
Diarks, which lies only in about 38° north, seems at
first very surprising; but considering that the place
stands on a rising ground in the midst of an extensive
plain, and that the high Cerdidian mountains lie to
the south and east of it, and the Armenian or Tureco-
manian to the north, whose heads are always covered
with snow, and even now in July supply the city with
water, it will not appear at all improbable, that in a very
fierce winter, such as was that in 1756, the inhabi-
tants of this city should so severely feel the effects of
it. Besides, fuel must have been extremely scarce,
especially among the poorer sort, as nothing of this
kind is produced but upon the mountains,
Diarrhœa, or Looseness, in medicine, is a
frequent and copious evacuation of liquid excrement by
foul. (See the Index subjoined to Medicine.)
Diarrhoeis, in anatomy, a kind of articula-
tion or juncture of the bones, which being very lax,
affords room for a more perfect motion. The word comes
from σύν and ἄγχος, junctor, affinigie. It is oppo-
sed to συστολή, wherein the articulation is so close
that there is no sensible motion at all. See Anatomy,
n° 2.
Diary, a term sometimes used for a journal or
day-book, containing an account of every day's pro-
cedings. Thus we say, diaries of the weather, &c.
Diarrhe Fever, is a fever of one day. See Epi-
emics.
Diachism, among musicians, denotes the differ-
ence between the comma and enharmonic diatons,
commonly called the lesser comma.
Diacordium, in pharmacy, a celebrated com-
position, so called from συστολή, one of its ingre-
dients. See Pharmacy.
Diastole, among physicians, signifies the dilata-
tion of the heart, auricles, and arteries; and stands
opposed to the συστολή, or contraction of the same
parts. See Anatomy, n° 124.
Diastole, in grammar, a figure in prosody where-
by a syllable naturally short is made long. Such is the
first syllable of Πραμάθεις in the following verce of
Virgil:

Arque his Priamides / nibil tibi, amicus, reliquum.

Diastylus, in rhetoric, a kind of hyperboles,
being an exaggeration of some low, ridiculous thing.
Diatriessaron, among ancient musicians, a
concord or harmonic interval, composed of greater
tone, a less tone, and one greater femitone: its pro-
portion in numbers is as 4:3.
Diatonick, in music, (composed of two
Greek words, ὀδός, the proposition στατ, signifying a tran-
formation into another thing to another, and the sublantive
στατ, importing a given degree of tension or musical
note), is in this way applied to a scale or gamut, to
intervals of a certain kind, or to forms of music,
whether in melody or harmony, composed of these in-
tervals. Thus we say the diatonick scale, a diatonick
interval, diatonick melody or harmony. As the diato-
nick scale forms the system of diatonick music, and
confists of diatonick intervals, it will be necessary, for
understanding the former, that we should explain the
latter. See Interval.
Diatragacanth, in pharmacy, a name ap-
plied to certain powders, of which gum tragacanth is
the chief ingredient.
Diarophragmia, in natural history, a gen-
us of foils of the order of septaria, whose partitions
or septa, consist of spar with an admixture of crytal.
Of this genus there are three species. 1. A red kind,
with brownish yellow partitions. 2. A brownish yel-
low kind, with whitish partitions. 3. A bluish-white
kind, with fraw-coloured partitions.
Dibble, or Dibber, a simple but useful imple-
ment in gardening, used for planting out all sorts of
young plants, &c.
Dibbling Wheat. See Agriculture, n° 126—129.
Dibio, or DIVIO (anc. geog.), the Divienenf Car-
trum, and the Diviunum of the lower age; a town of
the Lingones, in Gallia Belgica: Diviensem, the peo-
dle. Now Dijon, the capital of Burgundy. E. Long.
5° 5'. N. Lat. 47° 15'.
Dice, among gamesters, certain cubical pieces of
bone or ivory, marked with dots on each of their faces,
from one to six, according to the number of faces.
Sharers have several ways of falsifying dice. 1. By
licking a hog's brifile in them, fo as to make them
run high or low as they please. 2. By drilling and
loading them with quickilver; which cheat is found
out by holding them gently by two diagonal corners;
for if false, the heavy fides will turn always down.
3. By filing and rounding them. But all these ways
fall far short of the art of the dice-makers; some of
whom are fo dexterous this way, that your sharpening
gamesters will give any money for them.
Dice in Britain formerly paid 5s. every pair import-
ned, with an additional duty of 4s. 9d. for every 20s.
value upon oath; but are now prohibited to be imported.
Dicerarchus, a scholar of Arifotle, com-
piled a great number of books which were much cteem-
ed. Cicero and his friend Pomponius Atticus valued
him highly. He wrote a book to prove, that men
suffer more mischief from one another than from all
evil beside. And the work he compiled concerning
the republic of Lacedemon was extremely honoured,
and read every year before the youth in the assem-
blies of the phori. Geography was one of his principal
studies, on which science there is a fragment of a tra-
te of his till extant, and preferred among the veteris
geographiae scriptores minores.
Dichotomous, in botany. See Botany,
P. 442, n° 41.
Dichotomy, a term used by astronomers for
that phasis or appearance of the moon, wherein she is
bifected, or shows but half her disk. In this situ-
ation the moon is said to be in a quadrature aspect, or
to be in her quadrature.
Dicke, in old writers, denotes the quantity of
ten hides of skins, whereof 20 made a lart: also 10
pair of gloves, ten bars of iron, and the like, are som-
times expressed by the term dicke.
Dickinson, (Edmund), a celebrated English phy-
rician and chemist, born in 1624. He studied and
took
DIC

Didamnu, took his degrees at Merton-college, Oxford; and in 1653 published there his **Deiph Phaenomena**, &c. a most learned piece, in which he attempted to prove, that the Greeks borrowed the story of the Pythian Apollo, and all that rendered the oracle at Delphos famous, from the Holy Scriptures, and the book of Joshua in particular: a work that procured him great reputation both at home and abroad. He practiced physic at Oxford; but removing to London in 1684, his good fortune in recovering the ear of Arlington from a dangerous sickness, procured his promotion to be physician in ordinary to Charles II. and to his household. As that prince understood and loved chemist, Dr Dickinon grew into great favour at court; and was continued in his appointments under James II.

After the abdication of his unfortunate master, being then in years, and afflicted with the stone, he retired from practice, and died in 1707. He published many other things, particularly the **Physica vetus et nova**, &c. containing a system of philosophy chiefly framed on principles collected from the Mosaic history.

**DICTAMNUS, white Dittany, or Frasinaella**.

A genus of the monogynia order, belonging to the **candria class** of plants; and in the natural method of botany, ranking under the 26th order, **candria class**; and was continued in his appointments under Charles II.

A genus of the monogynia order, belonging to the **de canda** class of plants; and in the natural method of botany, ranking under the 26th order, **candria class**.

**DIC**

DICTATOR, a magistrate at Rome invested with regal authority. This officer was first chosen during the Roman wars against the Latins. The consuls being unable to raise forces for the defense of the state, because the plebeians refused to inflict if they were not discharged of all the debts they had contracted with the patricians, the Senate found it necessary to elect a new magistrate with absolute and uncontroulable power to take care of the state. The dictator remained in office for six months, after which he was again elected if the affairs of the state seemed to be desperate; but if tranquility was re-established, he generally laid down his power before the time was expired. He knew no superior in the republic, and even the laws were subjected to him. He was called dictator, because **dictatus**, named by the consul, or **quorum dictis ejus parbat populus**, because the people implicitly obeyed his command. He was named by the consul in the night **viva voce**, and his election was confirmed by the augurs.

As his power was absolute, he could proclaim war, levy forces, conduct them against an enemy, and disband them at his pleasure. He punished as he pleased; and from his decision there lay no appeal, at least till later times. He was preceded by 24 dictors with the fasces; during his administration, all other officers, except the tribunes of the people, were suspended, and he was the master of the republic. But amidst all this independence, he was not permitted to go beyond the borders of Italy, and he was always obliged to march on foot in his expeditions, and he never could ride in difficult and laborious marches without previously obtaining a formal leave from the people. He was chosen only when the state was in imminent dangers from foreign enemies or inward seditions. In the time of a pestilence a dictator was sometimes elected, as also to hold the **comitia**, or to celebrate the public festivals, or drive a nail in the capital, by which superstitious ceremony the Romans believed that a plague could be averted, or the progress of an enemy stopped. This office, so respectable and illustrious in the first ages of the republic, became odious by the perpetual usurpations of Sylla and J. Caesar; and after the death of the latter, the Roman Senate passed a decree which for ever after forbade a dictator to exilt in Rome. The dictator, as soon as elected, chose a subordinate officer called his master of horse, **magister equitum**. This officer was respectable; but he was totally subservient to the will of the dictator, and could do nothing without his express order. This subordination, however, was some time after removed; and during the second Punic war the master of the horse was invested with a power equal to that of the dictator. A second dictator was also chosen for the election of magistrates at Rome after the battle of Cannae. The dictatorship was originally confined to the patricians; but the plebeians were afterwards admitted to share it. Tito Largius Flavus was the first dictator, in the year of Rome 253.

**DICTION**, the phrase, elocution, or style, of a writer or speaker. See **Diarory**, p. 99—121.

**DICTIONARY**, in its original acceptation, is the arranging all the words of a language according to the order of the alphabet, and annexing a definition or explanation to each word. When arts and sciences began to be improved and extended, the multiplicity of technical terms rendered it necessary to compile dictionaries, either of science in general, or of particular sciences, according to the views of the compiler.

**Dictionary of the English Language.** The design of every dictionary of language is to explain, in the most accurate manner, the meaning of every word; and to show the various ways in which it can be combined with others, in as far as this tends to alter its meaning. The dictionary which does this in the most accurate manner, is the most complete. Therefore the principal study of a lexicographer ought to be, to discover a method which will be best adapted for that purpose. Dr Johnson, with great labour, has collected the various meanings of every word, and quoted the authorities; but, would it not have been an improvement if he had given an accurate definition of the precise meaning of every word; pointed out the way in which it ought to be employed with the greatest
DIC

1. Infantsly, without delay. Always employed to denote future time, and never past. Thus, we may say, I will come immediately; but not, I am immediately come from such a place. See Presently.

2. Without the intervention of any cause or event; as opposed to mediately.

IMMEDIATELY, adv. of time.

1. Infantsly, without delay. Exactly synonymous with immediately; being never with propriety employed to denote any thing but future time.

2. Formerly it was employed to express present time. Thus, The house presently possessed by such a one, was often used: but this is now become a vicious expression; and we ought to say, The house possessed at present. It differs from immediately in this, that even in the most corrupt phrases it never can denote past time.

FORM. fad. The external appearance of any object, when considered only with respect to shape or figure. This term therefore, in the literal sense, can only be applied to the objects of the sight and touch; and is nearly synonymous with figure: but they differ in some respects. Form may be employed to denote more rude and undefined shapes; figure, those which are more perfect and regular. Form can never be employed without denoting matter; whereas figure may be employed in the abstract; thus, we say a square or a triangular figure: but not a square or triangular form. And in the same manner we say, the figure of a house; but we must denote the substance which forms that figure, if we use the word form; as, a cloud of the form of a house, &c. See Figure.

2. In contrast to irregularity or confusion. As beauty cannot exist without order, it is by a figure of speech employed to denote beauty, order, &c.

3. As form respects only the external appearance of bodies, without regard to their internal qualities, it is, by a figure of speech, employed in contrast to these qualities, to denote empty show, without essential qualities. In this sense it is often taken when applied to religious ceremonies, &c.

4. As form is employed to denote the external appearance of bodies; so, in a figurative sense, it is applied to reasoning, denoting the particular mode or manner in which this is conducted; as, the Dictionary, form of a phalanx, &c.

5. In the same manner it is employed to denote the particular mode of procedure established in courts of law; as the forms of law, religion, &c.

6. Form is sometimes, although improperly, used to denote the different circumstances of the same body; as water in a fluid or a solid form. But as this phrase regards the internal qualities rather than the external figure, it is improper; and ought to be, water in a fluid or a solid state.

7. But when bodies of different kinds are compared with one another, this term may be employed to denote other circumstances than shape or figure; for we may say, a juice exuding from a tree in the form of wax or resin: although, in this case, the consistence, colour, &c. and not the external arrangement of parts, constitutes the resemblance.

8. From the regular appearance of a number of persons arranged in one long seat, such persons so arranged are sometimes called a form; as a form of students, &c. And,

9. By an easy transition, the seat itself has also acquired that name.

GREAT. adj. A relative word, denoting largeness of quantity, number, &c. serving to augment the value of those terms with which it is combined, and opposed to small or little. The principal circumstances in which this word can be employed are the following:

1. When merely inanimate objects are considered with regard to quantity, great is with propriety employed, to denote that the quantity is considerable; as, a great mountain, a great house, &c. and it is here contrasted with small. When great is thus employed, we have no other word that is exactly synonymous.

2. When inanimate objects are considered with regard to their extent, this term is sometimes employed, although with less propriety; as, a great plain, a great field, &c. And in this sense it is nearly synonymous with large; and they are often used indifferently, but with some difference of meaning: for, as large is a term chiefly employed to denote extent of superficies, and as great more particularly regards the quantity of matter; therefore, when large is applied to any object which is not merely superficial, it denotes that it is the extent of surface that is there meant to be considered, without regard to the other dimensions; whereas when the term great is employed, it has a reference to the whole contents. If, therefore, we say, a large house, or a large river, we express that the house, the river, have a surface of great extent, without having any necessary connection with the size in other respects. But if we say, a great house, or a great river, it at once denotes that they have not only a large surface, but are also of great size in every respect.

3. Great, when applied to the human species, never denotes the size or largeness of body, but is applied solely to the qualities of the mind. Thus, when
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when we say that Socrates was a great man, we do not mean that he was a man of great size, but that he was a man who excelled in the endowments of the mind. The terms which denote largeness of size in the human body are, big, bulky, huge, 

4. Great is sometimes applied to the human species, and denoting high rank. In this high it is often used in the plural number than otherwise. Thus we say simply, the great, meaning the whole body of men in high station, as opposed to mean. It should seldom be employed in this sense, as it tends to confound dignity of rank with elevation of mind.

5. As this is a general term of augmentation, it may be joined with all nouns which denote quantity, quality, number, excellence, or defects; or such as imply praise, blame, anger, contempt, or any other affection of the mind.

6. It is employed to denote every step of ascending or descending conflagrations; as, great-grandfather, great-grandson, &c.

HIGH. adj. Exalted in a perpendicular direction at a distance from the surface of the earth. Opposed to low.

1. High is a term altogether indefinite, and is employed to express the degree of elevation of any inanimate body. Thus we say, a high mountain, a high house, fleecy, tower, pillar, 

2. To express the perpendicular elevation of vegetables, either high or tall may be employed, as being in this sense nearly synonymous. We may therefore say, a high or tall tree, a high or tall man, &c. but with this difference between these two expressions, that tall can be more properly applied to those that are much elevated and of small dimensions; and high, to such as are more bulky, and of greater size.

3. The perpendicular height of man can never be expressed by the word high; tall being here the proper expression. And although high is sometimes used to express the height of other animals, yet it seems to be an improper expression. See Tall.

4. High, when applied to the human species, always refers to the mind; and denotes brightness, flatulence, pride, &c. and, when combined with the expressions of any energy of the mind, it denotes that in a higher degree. In this sense, it is opposed to meanness, abjectness, and humility.

5. As this is an indefinite term, tending to denote any thing that is elevated above us, it may be combined with almost every noun which admits of this elevation. And as objects high above us are always out of our reach, it is in a metaphorical sense used to denote any thing that seems to be above the ordinary condition of mankind; or those qualities or endowments of mind that are not easily acquired: as, dignity or elevation of sentiment; dignity of rank; acuteness in reasoning on difficult subjects; pride, haughtiness, or any other quality which seems beyond the ordinary level of mankind; dearness of price, &c.

6. In the same manner we apply this term to time; which having a metaphorical resemblance to a river flowing on with an unceasing current through all successive ages, any thing of remote antiquity is denoted by the term high.

7. Likewise those degrees of latitudes far removed from the line, where the pole becomes more elevated.

8. And to some particular crimes, as being attended with peculiar degrees of guilt; as, high treason.

TALL. adj. Something elevated to a considerable degree in a perpendicular direction. Opposed to low.

1. This term is chiefly employed to express the height of man and other animals; and is applied to denote the height of the body only, without having any reference to the mind. When applied to man, no other word can be substituted in its stead: when applied to other animals, high is sometimes considered as nearly synonymous. See High.

2. It is likewise employed to denote the perpendicular height of vegetables; and in this case, it is nearly synonymous with high. See High.

3. It can in no case be employed to express the height of merely inanimate objects; as we cannot say a tall fleecy, tower, or pillar, but a high fleecy, &c. For the distinctions in these cases, see High.

LONG. adj. A relative term, denoting the distance between the extremes of any body, which is extended more in one of its geometrical dimensions than another. Opposed to short.

1. This term may be applied to all inanimate objects, of whatever kind, whose dimensions in one way exceed the other, and when not in an erect posture, whatever be the other circumstances attending them; whether it relates to supercifices alone, or to solid bodies; whether these be bounded or open, straight or crooked, flexible or rigid, or in any other circumstances whatever; thus we say, along or short line, a long or short ridge, street, ditch, rope, chain, flaff, &c. But it is to be observed, that although long is in the strict sense only opposed to short; yet as it expresses the extension of matter in one of its geometrical proportions, it is often contrasted by those words which express the other proportions when we mean only to describe the several proportions: as, a table long and broad. And as these several dimensions are expressed by different words, according to the various forms, modifications, and circumstances, in which bodies are found, therefore it is in this sense contrasted by a great diversity of terms: as, along and broad or wide, narrow or frail, street or lane; a long and thick, or small, rope, chain, flaff. For the distinctions in these cases, see Broad, Wide, &c.

2. Objects necessarily fixed in an erect position can never have this term applied to them; and therefore we cannot say a long, but a high, tower or fleecy. And for the same reason, while trees are growing and fixed in an erect position, we cannot apply this term to them; but when they are fell-
ed and laid upon the ground, it is quite proper and necessary. Thus, we do not say a long, but a tall or high tree, while it is growing; but we say a long, not a tall log of wood: and in the same manner we say a tall mast, when it is fixed in the ship; but a long mast, while it lies upon the beach. See Tall and High.

3. Those vegetables which are of a tender pliant nature, or so weak as not to be able to retain a fixed position, being considered as of a middle nature between erect and prostrate bodies, admit of either of the terms long, tall, or high; as a long or tall reed or willow, or a long, tall, or high stalk of corn. See High and Tall.

4. The parts of vegetables, when considered as distinct from the whole, even when growing and erect, assume the term long: for we do not say a tall, but a long, shoot of a tree; and a tree with a long stem, in preference to a tree with a high stem.

5. For the same reason, a staff, and pole, even when fixed in a perpendicular direction, assume the word long, in preference to tall or high.

6. With regard to animals, the general rule is applied, without any exceptions: tall, and not long, being employed to denote the height of the human body, when in an erect posture; and long, and not tall, to denote its length when in an incumbent situation. Long, applied to all other animals which do not walk erect, always denotes their greatest length in a horizontal position from head to tail.

7. In a figurative sense, it denotes, with regard to time, any thing at a great distance from us.

8. As also, any thing that takes up much time before it is finished; as, a long discourse, a protracted note in music, &c.

BROAD, adj. The distance between the two nearest sides of any body, whose geometrical dimensions are larger in one direction than in another; and has a preference to sides only, and never to the solid contents. Opposed to narrow.

1. Broad, in the strictest acceptation, is applied to denote those bodies only whose sides are altogether open and unconfined; as a broad table, a broad wheel, &c.: and in these cases it is invariably contrasted by the word narrow; nor is there any other word which in these cases can be considered as synonymous with it, or used in its stead.

2. When any object is in some sort bounded on the sides, although not quite closed up, as a road, street, ditch, &c. either broad or wide may be employed, but with some difference of signification; broad being most properly used for those that are more open, and wide for those which are more confined: nor can this term be ever applied to such objects as are close bounded all around, as a house, a church, &c. wide being here employed. For the more accurate distinctions of these cases, see the article Wide.

WIDE, adj. A term employed to denote relative extent in certain circumstances. Opposed to narrow and strict.

1. This term is in its proper sense applied only to denote the space contained within any body closed all round on every side; as a house, gate, &c.; and differs from broad, in this that it never relates to the superficies of solid objects, but is employed to express the capaciousness of any body which containeth vacant space; nor can capaciousness in this sense be expressed by any other word but wide.

2. As many bodies may be considered either with respect to their capaciousness or superficial extent; in all these cases, either the term broad or wide may be used; as, a broad or wide street or ditch, &c. but with a greater or less degree of propriety, according to the circumstances of the object, or the idea we wish to convey. In a street where the houses are low and the boundaries open, or in a ditch of small depth and large superficies, as this largeness of superficies bears the principal proportion, broad would be more proper: but if the houses are of great height, or the ditch of great depth, and capaciousness is the principal property that affects the mind, we would naturally say a wide street or ditch; and the same may be said of all similar cases. But there are some cases in which both these terms are applied, with a greater difference of meaning; thus we say a broad or a wide gate: But as the gate is employed to denote either the aperture in the wall, or the matter which closes that aperture, these terms are each of them used to denote that particular quality to which they are generally applied: and as the opening itself can never be considered as a superficies, the term wide, in this case, denotes the distance between the sides of the aperture; while, on the contrary, broad denotes the extent of matter fitted to close that aperture: nor can these two terms in any case be substantiated for one another.

5. As a figurative expression, it is used as a cant phrase for a mistake: as, you are wide of the mark; that is, not near the truth.

NARROW, adj. A relative term, denoting a proportional smallness of distance between the sides of the superficies of plain bodies. Opposed to broad.

1. As this is only applied to superficies, it is exactly contrasted by broad, and is applied in all cases where the term broad can be used, (see Broad); and in no other case but as a contrast to it, except the following.

2. It sometimes is employed to describe the smallness of space circumscribed between certain boundaries, as opposed to wide, and nearly synonymous with strict; as we say a wide or a narrow house, church, &c. For the necessary distinctions here, see the article Strait.

3. In a figurative sense it denotes parsimony, poverty, confined sentiments, &c.

STRAIT, adj. A relative term, denoting the extent of space in certain circumstances. Opposed to wide: See Wide.

1. This term is employed, in its proper sense, to denote only space, as contained between surrounding bodies in such circumstances as to denote some degree of confinement: and is exactly opposed to wide: as a wide or a strict gate, &c. See Wide.

2. So necessary is it that the idea of confinement should
should be connected with this word, that in all those cases where the space contained is large, as in a church or house, we cannot express a smaller proportional width by this term. And as we have no other word to express space in these circumstances, we have been obliged to force the word narrow from its natural signification, and make it express this. See Narrow.

3. In some particular cases, narrow or strait may be employed to the same object; as, a narrow or a strait lane; but here strait is never employed but where an idea of confinement is suggested, and where it is exactly contrasted to wide; nor can narrow be employed but in such circumstances where broad would be a perfect contrast to it. Therefore these two terms may be always employed in the same circumstances as those which contrariwise them may be. For an account of which, see Wide.

3. The term strait is likewise in a peculiar manner used to denote the smallness of the internal diameter of those small bodies which are fitted to receive or contain others, as any kind of bag, tube, body-clothes, mortoises, and others of the same kind; and in all these cases this term may be employed to denote the smallness of their lesser diameter, and never the term narrow. But in certain circumstances the word tight may be substituted for it. See Tight.

4. Strait, in a figurative sense, denotes any sort of confinement of sentiment or disposition.

TIGHT. adj. A term employed in certain circumstances to denote the internal capacity of particular bodies. Nearly synonymous with strait. This term is confined entirely to denote the smallness of the internal dimensions of such objects as are formed to cover or to receive or contain other solid bodies, and can be employed in no other case. And although it agrees with strait, in always denoting confinement, and by being applicable to the same species of objects, yet it differs in the following respects: 1. If there be any difference of the diameter of the objects to which the term strait can be applied, it always has reference to the smaller; yet tight may be applied to any extent of confinement, whether it regards the length or breadth. 2. Strait can be applied to all bodies of capacity when of small diameter, without any sort of reference to the nature of the substance which it may be capable of containing. For we can say a strait bag, a strait sleeve, a strait mortoise, a strait gate, &c. whereas tight can only be applied to any body when it is considered as having reference to another body which is intended to be contained in it, and is pinched for want of room. Thus we say, the sleeve of a coat is too tight for the arm, the mortoise is too tight for the tenon, &c. but we cannot say, the bag, or the gate, is too tight, because these are fitted to receive any sort of objects. And hence it happens, that, in many cases, the dimensions of the same body may be expressed by tight or strait when considered in different circumstances. Thus we may say, this sleeve is too strait, when we look at a coat when lying on the table, and consider its Dictionary. proportions; but it is not till we have tried it upon the arm that it is intended to cover, that we call it tight. And we may say, a gate is too strait, or too tight: but in the first case we consider it as being too confined for admitting objects to pass through it; and in the last, as being too confined with respect to the leaves that are to shut the aperture, not allowing them space to move with freedom.

These examples may serve to give some idea of the plan of an English Dictionary compos'd upon philosophical principles: But, besides the circumstances above enumerated, there are many others which would require particular attention in the execution of a work of this kind. In the English language, a great variety of terms occur, which denote matters under certain general forms or circumstances, without regarding the minute diversities that may take place; as the word cloth, which denotes matter as manufactured into a particular form, including under it all the variety of stuffs manufactured in that particular way, of whatever materials, colours, texture or fineness, they may be. The same may be said of wood, iron, yarn, and a great variety of terms of the same nature, some of which cannot assume any plural; while others admit of it in all cases, and others admit or refuse it according to the different circumstances in which they are considered.

In a dictionary, therefore, all this variety of cases ought to be clearly and distinctly pointed out under each particular article: this is the more necessary, as some of these words have other forms from them, which might be readily mistaken for their plurals, although they have a very different signification: as cloaths, which does not denote any number of pieces, or different kinds of cloth, but wearing apparel. The following example will illustrate this head.

WOOD, sub. A solid substance, of which the trunks and branches of trees consist.

1. This term is employed to denote the solid parts of vegetables of all kinds, in whatever form or circumstances they are found. Nor does this term admit of plural with propriety, unless in the circumstances after-mentioned: for we say, many different kinds of wood, in preference to many kinds of woods; or, we say, oak, ash, or elm wood, not woods.

2. But where we want to contrast wood of one quality or country with that of another, it admits of a plural: for we say, white woods are in general softer than red, or West Indian woods are in general of greater specific gravity than the European woods: But unless where the colour, or some quality which distinguishes it from growing wood, is mentioned, this plural ought as much as possible to be avoided, as it always suggests an idea of growing wood.

3. Woodlikewise denotes a number of trees growing near one another; being nearly synonymous with forest: See Forest. In this sense it always admits of a plural; as, Te woods and wilds whose solitary gloom, &c.

A dictionary cannot be reckoned complete without explaining obsolete words; and if the terms of the several
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Dictionary, verbal provincial dialects were likewise given, it would be of great utility; nor would take much time; because a number of these words need no other explanation than to mark along with them the words which had come into regular use, when there happened to be one perfectly synonymous: and in those cases where the same idea could not be expressed in modern language without a parenthesis, it would be of use to explain them distinctly; so that, when a writer found himself at a loss for a term, and obliged to search for one beyond the bounds of our own language, he might take one of these, when he found that it was expressive and energetic, in preference to another drawn from a foreign language. This would at least have one good effect: it would make our language more fixed and stable; not to say more accurate and precise, than by borrowing from foreign languages. The following examples may serve to give some idea of the manner of treating this part of the work.

MOE, or MO, adj. An obsolete term still employed in the Scotch dialect, and by them pronounced mae, denoting a greater number, and nearly synonymous with more; but it differs in this respect, that in the Scotch dialect, mae and mair (English more) are each employed in their distinct sphere, without encroaching upon one another; mae being employed to denote number, but never quantity or quality; and mair, to denote quantity and quality, but never number; thus they say mae, not mair, apples, men, &c. and they say mair, not mae, cloth, earth, courage, &c. See Mair.

Both of these terms are supplied by the word more, which in the English language is applied indiscriminately to denote quantity, quality, and number. See More.

THIR, pron. Obsolete; still employed in the Scotch dialect: the plural of this; and contrasted to these, in the same manner as that to this.

As there is no word in the English language equivalent to this, we thus show the manner in which it is employed. In the English language we say, that these or hose, pointing at one at a distance, is larger or more conimonous than this one or this house, which is supposed to be at hand. In the same manner, in the Scotch dialect, they say, these (or, as it pronounced, that) fones are whiter than this stone; denoting, that the former are at a distance and the latter at hand. And, in the same manner, it is invariably applied to denote any person object in the plural number, as opposed to these: as these or their apples, as at hand, or at a distance; these, or these trees, &c.; but never in the singular number, as it is always this or that tree, house, &c.

As the English language is so exceedingly irregular in the pronunciation, the same letter in the same situation often assuming sounds totally different in different words, it is impossible to establish any general rules on this subject, which do not admit of many exceptions: therefore, a dictionary is the best means of ascertaining and pointing out the proper pronunciation of words. For, if the writer first pointed out all the different sounds that the same letter could ever be made to express, and aligned to every particular sound which each letter could be made to assume, a particular mark, Dictionary which was appropriated to denote that particular sound of the letter whenever it occurred; by placing these particular marks above the letters in the dictionary, the sound of each letter would be pointed out in all cases with the utmost certainty. It would be impossible for us to illustrate this by examples, without first ascertaining all the sounds of each letter; which would lead us into a discussion too long for this place.

We shall only further observe, that, besides having the accent of syllable of every word properly distinguished in a dictionary to assist in the pronunciation, the English language requires another essential improvement, viz. the use of accents to distinguish the meaning of words and phrases: which, although it is not so properly confined to a lexicographer, yet it is not quite without its sphere. Thus the word as admits of two very different sounds, as well as different significations: as in this example, "Cicero was nearly as eloquent as Demosthenes: in which the first as is pronounced afsi, and the last is pronounced az. Now, it often happens, that, in reading, the particular way in which it ought to be understood is not pointed out by the context, till after the word itself is pronounced, which has an equal chance at least of being pronounced wrong; whereas, if it were always accented when employed in the one sense, and not in the other, it would free the reader from this perplexity. There are other cases in which the use of proper accents in writing would be of great consequence; as at the beginning of a sentence, when it was put as a question, or used ironically, &c. the want of which every one must have observed. But as this does not so properly belong to the lexicographer as the grammarian, we shall here take no further notice of it.

The above examples, we hope, will be sufficient to give the reader some idea of the plan that we would propose; and enable him to determine, whether or not a dictionary, executed upon this plan, would convey to his mind a more perfect knowledge of the English language, than those dictionaries that have hitherto been published. These examples were given rather with a view to shew the manner in which a work of this kind might be conducted, than as perfect and unexceptionable explanations of the several articles there enumerated; and therefore we did not think it necessary to produce any authorities, although we are sensible that they would be requisite in such a work.

DICTYMNIA, or DICTYNNIA, in mythology, were feasts celebrated at Lacedaemon and in Crete, in honour of Diana Dictymina, or Dictynnia, or of a nymph taken for her, who, having plunged herself into the sea, to escape the passion of Minos, was caught in a fisherman's net or Avvnon, whence the name.

DICTYS (Cretensis), a very ancient historian, who serving under Idomenius king of Crete in the Trojan war, wrote the history of that expedition in nine books; and Tzetzes tells us, that Homer formed his Iliad upon the plan of that history. It is however maintained, that the Latin history of Dictys which we have at present is spurious.

DIDACTIC, in the schools, signifies the manner of speaking or writing, adapted to teach or explain the
The Didelphis, or opposum, in zoology; a genus of quadrupeds belonging to the order of feræ, the characters of which are these: They have ten fore-teeth in the upper jaw, and eight in the under one. The dog-teeth are long; the tongue dachic; very thin ears; small, black, lively, eyes; long Greek 01 a clothed with long hairs like those on the back; the belly, dirty white hair: the tail, for near three inches, the hind part of the neck and back covered with hair like the body of a snake, and has the same walks very now; and when pursued and overtaken will feign itself dead. Description of quadrupeds belonging to the order of didactic and dogmatic way: and there are many works, ancient and modern, both in prose and verse, written after this method: such are the Georgies of Virgil, Lucretius's poem De Rerum Natura, and Pope's Epistles on Criticism and on Man, &c. &c.

Plate CLV

The nature of things.—The word is formed from the Greek ὁ νόμος, doceo, "I teach."

There are many words that are only used in the didactic and dogmatic way; and there are many works, ancient and modern, both in prose and verse, written after this method: such are the Georgies of Virgil, Lucretius's poem De Rerum Natura, and Pope's Epistles on Criticism and on Man, &c. &c.

It is dyed by the Indian women, and woven into garters and girdles; the skin is very tinct.

The Monaca opus has long, oval, and naked ears; the mouth is very wide; the lower side of the upper jaw, throat, and belly, is of a whitish ash colour; tail of the hair a cinerea brown tip with tawny, darkest on the back; the tail is as long as the body; near the base covered with hair, the tail naked: the claws are hooked. On the belly of the female is a pouche, in which the young (like those of the former) shelter. Maregrave sound fix young within the pouche. It has ten cutting teeth above and eight below. The length of the animal from nose to tail three inches; and the tail exceeds the length of head and body. Its whole figure is of a much more slender and elegant make than the former. The tail pulverified, and taken in a glass of water, is reckoned in New Spain a sovereign remedy against the gravel, colic, and several other disorders. This species is found in great numbers in Aroe and Solor: It is called in the Indies pelandor aroe, or the aroe rabbit. They are reckoned very delicate eating; and are very common at the tables of the great, who rear the young in the same places in which they keep their rabbits. It inhabits also Surinam, and the hot parts of America.

The murina or murine opus, hath the face and upper parts of the body of a tawny colour; the belly of a yellowish white: the tail is slender, and covered with minute furies to the very rump: the length of the animal from nose to tail, about six inches and a half; the tail of the same length: the female wants the tawny belly of the former; but on the lower part the skin forms on each side a fold, between which the teats are lodged. It inhabits the hot parts of South America; agrees with the others in its food, manners, and the prehensile power of its tail. It brings from 10 to 14 young ones at a time: they affix themselves to the teats as soon as they are born, and remain attached like inanimate things, till they attain growth and vigour to fling a little for themselves.

4. The Mexican opus, is of an ash-colour on the head and upper parts of the body: the belly and legs are whitish: the tail is long and pretty thick, varied with brown and yellow; it is hairy near an inch from its origin, the rest naked; the length of the animal from nose to tail, about seven inches and a half; of the tail, more than 11. It inhabits the mountains of Mexico, and lives in trees, where it brings forth its young: when in any fright, they embrace the parent closely. The tail is prehensile, and serves instead of a hand.

5. The phalanger, or Surinam opus of Buffon, has the upper part of the body reddish, mixed with a light ash-colour and yellow: the under parts are of a dirty yellowish white; the bottom of the tail is covered with hair, for near two inches and a half; the tail naked; the length of the animal from nose to tail is near nine inches; the tail thick. It inhabits Surinam, according to Buffon; who supposed it may be the species called by the colonists the case rat, which is so destructive to the sugar-canes. According to Dr Pallas, it inhabits the East India Islands, but is not found in Surinam.

6. The dorfigera, or merian opus, hath the head and upper part of the body of a yellowish brown colour; the belly white, and tinged with yellow; the
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Didelphis. Tail very long and slender, and, except at the base, quite naked.—It is a native of Surinam, and burrows under ground; it brings five or six young at a time, which follow their parent: on any apprehension of danger, they jump on her back, and twisting their tails round hers, she immediately runs with them into her hole.

7. The kangaroo. This animal has a small head, neck, and shoulders; the body increasing in thickness to the rump. The head is oblong, formed like that of a fan, and tapering from the eyes to the nose; end of the nose naked and black; the upper lip divided. The nostrils are wide and open; the lower jaw is small; and going progressively from rock to rock.

The kangaroo goes timid: at the sight of men it flies from them by as yet been discovered in no other part of the world. It inhabits the western side of New Holland, and has as yet been discovered in no other part of the world. It lurks among the grass; and feeds on vegetables: it goes entirely on its hind legs; making use of the fore feet only for digging, or bringing its food to its mouth. The dung is like that of a deer. It is very timid: at the sight of men it flies from them by amazing leaps, springing over bulges seven or eight feet high: and going progressively from rock to rock. It carries its tail quite at right angles with its body Didelphis, when it is in motion; and when it alights, often looks back.

In the account lately published of Governor Phillip’s Voyage, we are told that these animals have been seen feeding in herds of about 30, one and that one is always observed to be apparently on the watch at a distance from the rest.—The largest kangaroo which has yet been shot, we are told, weighed about 140 pounds. But it has been discovered that there are two kinds, one of which seldom exceeds 60 pounds in weight: these live chiefly on the high grounds: their hair is of a reddish cast, and the head is shorter than the larger fort. Young kangaroos which have been taken, have in a few days grown very tame, but none have lived more than two or three weeks. Yet it is still possible that when their proper food shall be better known, they may be domesticated. Near some water was found the dung of an animal that fed on grass, which, though it was supposed, could not have been less than a horse. A kangaroo, so much above the usual size, would have been an extraordinary phenomenon, though no larger animal has yet been seen, and the limits of growth in that species are not ascertained. The tail of the kangaroo, which is very large, is found to be used as a weapon of offence, and has given such severe blows to dogs as to oblige them to desist from pursuit. Its flesh is coarse and lean, nor would it probably be used for food, where there was not a scarcity of fresh provisions.

Mr. Pennant observes, that this is a very anomalous animal; but ranks it under this genus as having more relation to it than to any other. In the account of Phillip’s Voyage, however, we are informed, that the pouch of the female, hitherto esteemed peculiar to the opossum genus, has been found both in the rat and the squirrel kind in New Holland.

8. The quoll, or spotted opossum, is described as in length from the nose to the beginning of the tail about 15 inches, and the tail about nine or ten. The general colour black, inclining to brown beneath; the neck and body, spotted with irregular roundish patches of white; the ears pretty long and erect; the vissage pointed, the muzzle furnished with long slender hairs; the legs, from the knees downward, almost naked, and ash-coloured; on the fore feet are five claws, and on the hind, four and a thumb without a claw; the tail, for about an inch and a half from the root, is covered with hairs of the same length as those on the body, from thence to the end with long ones not unlike that of a squirrel. The female has two teats placed in a circle within the pouch.

9. The kangaroo rat is described as similar, both in the general shape of the body and the conformation of the legs, to the kangaroo; but the vissage having a strong resemblance to that of the rat, and the colour of the whole not ill resembling that animal, it has obtained the name of the kangaroo rat. It is an inhabitant of New Holland; and two of the species are now to be seen alive at the curious exhibition of animals over Exeter Exchange; where one of them, being a female, has brought forth young. This species has two cutting teeth in front of the upper jaw, with three others on each side of them, and at a distance
10. The flying opossum, a beautiful species, and clothed with fur of the most exquisite texture, is an inhabitant of New Wales. In length, from the tip of the nose to the root of the tail, it is 20 inches; the tail itself is 22 inches, at the base quite light, increasing gradually to black at the end: the ears are large and erect: the coat or fur is of a richer and more delicate texture; appearing, on the upper parts of the body, at first light, of a glossy black, but on a nearer inspection found to be mixed with grey; the under parts are white, and on each hip is a tan-coloured spot nearly as big as a thimble; at this part the fur is thinnest, but at the root of the tail it is so rich and close that the hide cannot be felt through it. The fur is also continued to the claws. On each side of the body is a broad flap or membrane (as in the flying squirrels), which is united to both the fore and hind legs. The jaws are furnished with teeth, placed as in some others of this genus: in the upper jaw forwards are four small cutting teeth, then two canine ones, and backwards five grinders: the under jaw has two long large cutting teeth, five grinders, with no intermediate canine ones, the space being quite vacant. The fore legs have five toes on each foot, with a claw on each; the hinder ones four toes, with claws (the three outside ones without any separation), and a thumb without a claw, enabling the animal to use the foot as a hand, as many of the opusim tribe are observed to do.

11. The Cayenne opossum has a long slender face; ears erect, pointed, and short: the coat woolly, mixed with very coarse hairs, three inches long, of a dirty white from the roots to the middle; from thence to the ends of deep brown: sides and belly of a pale yellow; legs of a dusky brown; thumb on the toes of the hind feet crooked; and on the toes of the fore feet, thumb on each, a very long claw, and scaly. Length 17 French inches; of the tail fifteen and a half. The subject measured was young. Inhabits Cayenne: very active in climbing trees, on which it lives the whole day. In marshy places, feeds on crabs, which when it cannot draw out of their holes with its feet, it hooks them by means of its long tail. If the crab pinches its tail, the animallets up a loud cry, which may be heard afar: its common voice is a grunt like a young pig. It is well furnished with teeth, and will defend itself stoutly against dogs; brings forth four or five young, which it secures in some hollow tree. The natives eat these animals, and say their flesh resembles a hare. They are easily tamed, and will take any kind of food.

12. The New Holland opossum has the upper part of the head, and the back and sides, covered with long, soft, glossy hairs, of a dark cinereous colour at the bottoms, and of a rufy brown towards the ends: the belly is of a dirty white. The tail is taper, covered with short brown hairs, except for four inches and a half of the end, which is white, and naked underneath: the toes like those of the former. Described by Mr. Pennant from a skin, the length of which, from the head to the tail, was 13 inches, and the tail the same. The animal was found near Endeavour river, on the eastern coast of New Holland, with two young ones. It lodges in the grass, but is not common. There are two or three other species.

Dido, called also Elisa, a daughter of Belus king of Tyre, who married Sichæus or Sichabras her uncle, who was priest of Hercules. Pygmalion, who succeeded to the throne of Tyre after Belus, murdered Sichæus to get possession of the immense riches which he had; and Dido, disconsolate for the loss of her husband, whom she tenderly loved, and by whom she was equally effectuated, set sail in quest of a settlement with a number of Tyrians, to whom the cruelty of the tyrant became odious. According to some accounts, she threw into the sea the riches of her husband which Pygmalion so greedily desired, and by that artifice compelled the ships to fly with her that had come by order of the tyrant to obtain the riches of Sichæus. During her voyage, Dido visited the coast of Cyprus; where she carried away 50 women who prostituted themselves on the sea-shore, and gave them as wives to her Tyrian followers. A storm drove her fleet on the African coast, and the gold of the inhabitants as much land as could be covered by a bulls hide cut into thongs. Upon this piece of land she built a city called Byrsa; and the increase of population, and the rising commerce among her subjects, soon obliged her to enlarge her city and the boundaries of her dominions. Her beauty, as well as the fame of her enterprise, gained her many admirers; and her subjects wished to compel her to marry Iarbas king of Mauritania, who threatened them with a dreadful war. Dido begged three months to give her decisive answer; and during that time she erected a funeral pile, as if willing by a solemn sacrifice to appease the manes of Sichæus, to which she had promised eternal fidelity. When all was prepared, the flayed herself on the pile in presence of her people; and by this unnatural action obtained the name of Dido, "Valiant woman." She sailed to the coast of Africa. According to Virgil and Ovid, the death of Dido was caused by the sudden departure of Æneas; of whom she was deeply enamoured, and whom she could not obtain as a husband. This poetical fiction represents Æneas as living in the age of Dido, and introduces an anachronism of near 300 years. Dido left Phoenicia 247 years after the Trojan war or the age of Æneas, that is, about 953 years before Christ. This chronological error proceeds not from the ignorance of the poets, but it is supported by the authority of Horace:

**Aut famamque, aut sibi convemens fugit.**

While Virgil describes, in a beautiful episode, the desperate love of Dido, and the fulmination of Æneas to the will of the gods, he at the same time gives an explanation of the hatred which existed between the republics of Rome and Carthage; and informs his reader, that their mutual animosity originated in their very first foundation, and was apparently kindled by a more remote cause than the jealousy and rivalship of two flourishing empires. Dido after her death was honored as a deity by her subjects.
DIDUS, or Dodo, in ornithology, a genus belonging to the order of Gallinæ. The bill is constricted in the middle by two transverse râges; each mandible is inflected at the point; and the face is bare behind the eyes. Only one species, the ineptus, is mentioned by Linnaeus; but three are described by Buffon; though it is doubted whether on further observation they may not all prove one and the same species, differing only in sex or age.

1. The drome, or hooded dodo, (ineptus, Lin.), is somewhat bigger than a swan, and near three feet in length. The bill is strong, large, and hooked at the end; the gape stretches beyond the eyes: the colour of it is a very pale blue; except the end of the upper mandible, which is yellowish, and a red spot on the bend of it; the end of the lower is blackish; the irides are white. The general colour of the plumage is cinnereous, and soft to the touch; the belly and thighs are white. The head is large, and seems as it were covered with a black hood or cowl. The wings are very short, and of a yellowish ash-colour: the tail feathers are curled, stand up on the rump, and incline to yellow. The legs have four toes, three before and one behind; are very stout, short, and yellowish; the claws are black. It inhabits the islands of Mauritius and Bourbon in the Indian Ocean.

2. The solitaire, or solitary dodo, is a large bird, and the male is said to weigh sometimes 45 pounds. The neck is of a proportionable length, and the eye black and lively: the head is not crested, and the general colour of the plumage is grey and brown mixed: it has scarce any tail, and the bastard wing swells out into a round knob: the wings are too short for flight: and the hind parts are rounded like a horse's rump, being clothed with feathers, which may be termed covertis. — The females are covered with sometimess brown and sometimes light yellow feathers, and appear very beautiful. The feathers on each side of the breast enlarge into two white tufts, somewhat resembling the bofon of a woman. Those of the thighs are rounded at the end like shells; and, according to Leguat, the bird has altogether a noble and elegant gait. This is an inhabitant of the Isle of Rodrigue, where it is not uncommon; but not met with in flocks, fearfully more than two being found together. It makes the nest in hy-places, of leaves of the palm, a foot and a half in thickens; and lays one egg, bigger than that of a goose. The male sits in his turn; and does not suffer any bird to approach within 200 yards of the spot while the heat is fitting, which is seven weeks. The young is some months before it can shift for itself; the old ones, in the mean time, are affectionate to it, and faithful to each other afterwards, though they occasionally may mix with others of their kind. The young birds, though timid, are stupid enough to suffer the approach of any one; but when grown up are morethy, and will not be named. They are chased in the winter season, viz. from March to September; being then fat, and the young birds are much esteemed for the table.

3. The Nazarene dodo is bigger than a swan. The bill is a little bent downwards and large: instead of feathers, the whole is covered over with a black down; but the wings are feathered, and it has some frizzled ones upon the rump, which serve instead of a tail: the legs are long and feicy, and there are three toes on each foot. This was met with in the Ile of France, and described as above by Fr. Cauche; who adds, that the female only lays one egg, which is white, and as big as a penny loaf, and that there is always found with it a white floiine of the size of an hen's egg: that it makes the nest of leaves and dry herbs, in the forests, on the ground; and that there is likewise found a grey floine in the gizzard of the young bird.

DIDYMUS of Alexandria, an ecclesiastical writer of the fourth century; who, though he is said to have lost his eyes at five years of age, when he had fearfully learned to read, yet applied so earnestly to study, that he attained all the philosophic arts in a high degree, and was thought worthy to fill the chair in the famous divinity-school at Alexandria. He was the author of a great number of works; but all we have now remaining are, a Latin translation of his book upon the Holy Spirit, in the works of St Jerome, who was the translator; short epitomises on the Canonical Epistles; and a book against the Manichees.

DIDYNAMA (from δί, twice, and δύο, power), the name of the 14th class in Linnaeus's sexual method; consisting of plants with hermaphrodite flowers, which have four stamens or male organs, two of which are long and two short. See Botany, the scheme, and Plate CII. fig. 14.

DIEMEN'S LAND, the southern coast or point of New Holland, S. Lat. 43° 21' 20", E. Long. 147° 29'. This coast was discovered in November 1642 by Tafman, who gave it the name of Van Diemen's Land. Captain Furneaux touched at it in March 1773, and the country has been since further explored by late navigators. Here is a very safe road, named by Captain Cook Adventure Bay. The parts adjoining to the bay are mostly hilly, and form an entire forest of tall trees, rendered almost impaissable by brakes of fern, shrubs, &c. The soil on the flat land, and on the lower part of the hills, is sandy, or confines of a yellowish earth, and in some parts of a reddish clay; but further up the hills it is of a grey tough calt. This country, upon the whole, bears many marks of being very dry, and the heat appears to be great. No mineral bodies, nor flakes of any other kind than the white sand-flake, were observed: nor any vegetables that afforded subsistence for man. The forest-trees are all of one kind, generally quite straight, and bearing clusters of small white flowers. The principal plants observed were wood-ferrel, milk-wort, cudweed, bell-flower, gladiolus, samphire, and several kinds of fern. The only quadruped seen distinctly was a species of opossum, about twice the size of a large rat. The kangaroo, found farther northward in New Holland, may also be supposed to inhabit here, as some of the inhabitants had pieces of the skin of that animal. The principal sorts of birds in the woods are brown hawks or eagles, crows, large pigeons, yellowish paroquets, and a species which was called motulda cyanea, from the beautiful azure colour of its head and neck. On the shore were several gulls, black oyster-catchers or sea-pies, and plovers of a flone-colour. In the woods were seen some thickish snakes of a pretty large size; and a species of lizard fifteen inches long and fix round, beautifully
Diemen's Land, Dieppe.

Diemen’s Islands, and jackets, bream, flounders, with were the mosquitoes; and a large fort, in Holland, in 1609, where he acquired great skill in fishing, and upon the beach were found some pretty noxes are broad and full, and the lower part of the face makes them very remarkable, and testified no acuteness of understanding. Their complexion is a dull black, which they sometimes heighten by inmutting their bodies, as was supposed from their leaving a mark behind on any clean surface. Their hair is perfectly woolly, and is clotted with a greasy and red ochre-like that of the Hottenots. Their noses are broad and full, and their lower part of the face projects considerably. Their eyes are of a moderate size; and though they are not very quick or piercing, they give the countenance a frank, cheerful, and pleasing cast. Their teeth are not very white nor well set, and their mouths are wide: they wear their beards long and clotted with paint. They are upon the whole well proportioned, though their belly is rather protuberant. Their favourite attitude is to stand with one side forward, and one hand grasping across the back the opposites arm, which on this occasion hangs down by the side that projects.

Near the shore in the bay were observed some wretched constritions of sickles covered with bark; but these seemed to have been only temporary, and they had converted many of their largest trees into more comfortable and commodious habitations. The trunks of these were hollowed out to the height of six or even feet by means of fire. That they sometimes swell in them was manifest from their heartings in the middle made of clay, round which four or five persons might fit. These places of shelter are rendered durable by their leaving one side of the tree found, so that it continues growing with great luxuriance.

Diemerbroek, (librand), a learned professor of physic and anatomy at Utrecht, was born at Montfort, in Holland, in 1609, where he acquired great reputation by his lectures and his practice; and died at Utrecht in 1674. He wrote a treatise on the plague, which is esteemed; and several learned works in anatomy and medicine, which were printed at Utrecht in 1685 in folio.

Dieppe, a handsome sea-port town of France, in Upper Normandy, in the territory of Caux; with a good harbour, an old castle, and two handfome moles. The parish-church of St James is an elegant structure; and there is a tower from which, in fine weather, the coast of England may be seen. The principal trade consists in herrings, whittings, mackerel, ivory, toys, and laces. It was bombarded by the English in 1694, and it is not now so considerable as it was formerly. It is seated at the mouth of the river Argues, in E. Long. 1° 9. N. Lat. 49° 35'.

Diepse March, the day of congress or meeting of the English and Scots, annually appointed to be held on the marches or borders, in order to adjust all differences between them.

Diesis, in music, is the division of a tone less than a semitone; or an interval consisting of a less or imperfect semitone.

Diesis is the smallest and softest change or inflexion of the voice imaginable, it is called a faint, expressed thus X, by St. Andrew's crows or falter.

Diesipter, in antiquity, a name given to Jupiter; and signifying dies pater, "father of the day." St. Augustine derives the name from dies "day," and partus "production, bringing forth," it being Jupiter that brings forth the day. Of which fentiments were Servius and Macrobius: the former adding, that in the language of the Olci they called Lucanus, as Diesipter in Latin.

Diet, in medicine, according to some, comprehends the whole regimen or rule of life with regard to the six non-naturals: air, meats and drinks, sleep and watching, motion and rest, passions of the mind, expectations and excitements. Others restrain the term of diet to what regards eating and drinking, or solid aliment and drinks. Sea Food.

The natural constitution of the body of man is such, that it can easily bear some changes and irregularities without much injury. Had it been otherwise, we should be almost constantly put out of order by every slight cause. This advantage arises from those wonderful communications of the inward parts, whereby, when one part is affected, another comes immediately to its relief.

Thus, when the body is too full, nature causes evacuations through some of the outlets: and for this reason it is, that diseases from inanition are generally more dangerous than from repulsion; because we can more expeditiously diminish than increase the juices of the body. Upon the same account, also, though temperance be beneficial to all men, the ancient physicians advised persons in good health, and their own masters, to indulge a little now and then, by eating and drinking more plentifully than usual. But of the two, incontinence in drinking is fatter than in eating: and if a person has committed excess in the latter, cold water drank upon a full stomach will help digestion; to which it will be of service to add lemon juice, or elixir of vitriol. If he has eaten high seasoned things, rich soups and drinks, he ought to avoid all labious work. From satiety it is not proper to pass directly to sharp hunger, nor from hunger to satiety: neither will it be safe to indulge absolute rest immediately after excessive labour, nor suddenly to fall to hard work after long idleness. In a word, therefore, all changes in the way of living should be made by degrees.

The fatter and milder kinds of aliment are proper for children, and for youth the stronger. Old people ought to leiften the quantity of their food, and increase that of their drink: but yet some allowance is to be made for custom, especially in the colder climates like ours; for as in thefe the appetite is keener, so is the digestion,
D I E [   22 ] D I E

Digestion better performed. Medus Monitis & Præ-
cepta.

Diet-Drinks, a form in physic, including all the
medicated wines, ales, and wheys, used in chronic
cases. They require a course or continuation to an-
swer any intention of moment.

Diet of Appearance, in Scots law, the day to which
a defendant is cited to appear in court; and every other
day to which the court shall afterwards adjourn the
consideration of the question.

Diet, or Dyet, in matters of policy, is used for the
general assembly of the states or circles of the empire
of Germany and of Poland, to deliberate and concert
measures proper to be taken for the good of the public.

The general diet of the empire is usually held at
Ratisbon. It consists of the emperor, the nine elec-
tors, and ecclesiastical princes; or the archbishops,
bishops, abbots, and abbeys; the secular princes,
who are dukes, marquises, counts, viscounts, or bar-
ons; and the representatives of the imperial cities.
It meets on the emperor's summons, and any of the
princes may send their deputies thither in their
families, by the

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ons; and the representatives of the imperial cities.
It meets on the emperor's summons, and any of the
princes may send their deputies thither in their
families, by the

DIET.DRIKKS, U D I E T, U D I E T.
Thus the light diffused by the rays of the sun, fills all round from that amazing body of fire.

DIGASTRUS, in anatomy, a muscle of the lower jaw, called also Biventer. See Anatomy, Table of the Muscles.

DIGBY (Sir Kenelm), became very illustrious in the 17th century for his virtue and learning. He was defended of an ancient family in England. His great-grandfather, accompanied by his brothers, fought valiantly at Bosworth-field on the side of Henry VII. against the usurper Richard III. His father, Everard, suffered himself to be engaged in the gun-powder plot against King James I. and for that crime was beheaded. His son wiped of that stain, and was restored to his estate. King Charles I. made him gentleman of the bed-chamber, commissioner of the navy, and governor of the Trinity-house. He granted him letters of reprisal against the Venetians, by virtue whereof he took several prizes with a small fleet which he commanded. He fought the Venetians near the port of Scanderoon, and bravely made his way through them with his booty. He was a great lover of learning, and translated several authors into English; and his "Treatise of the Nature of Bodies and the Immortality of the Soul," discovers great penetration and extensive knowledge. He applied to chemistry; and found out several useful medicines, which he gave freely away to people of all sorts, especially to the poor. He distinguished himself particularly by his sympathetic powder for the cure of wounds at a distance; his discourse concerning which made a great noise for a while. He had conferences with Des Cartes about the nature of the soul.

In the beginning of the civil wars, he exerted himself very vigorously in the king's cause; but he was afterwards imprisoned, by the parliament's order, in Winchefter house, and had leave to depart thence in 1643. He afterwards compounded for the estate, but was ordered to leave the nation; when he went to France, and was sent on two embassies to pope Innocent X. from the queen, widow of Charles I. whose children he then was. On the Restoration of Charles II. he returned to London; where he died in 1665, aged 60.

This eminent person was, for the early pregnancy of his parts, and his great proficiency in learning, compared to the celebrated Pico de Miranda, who was one of the wonders of human nature. His knowledge, though various and extensive, appeared to be greater than it really was; as he had all the powers of eloquence and address to recommend it. He knew how to shine in a circle of ladies or philosophers; and was as much attended to when he spoke on the most trivial subjects, as when he spoke on the most important. It is said that one of the princes of Italy, who had no child, was desirous that his princess should bring him a son by Sir Kenelm, whom he esteemed a just model of perfection.

DIGEST, Digestus, a collection of the Roman laws, ranged and digested under proper titles, by order of the emperor Justinian.

That prince gave his chancellor Tribonianus a commission for this purpose; who, in consequence thereof, chose sixteen juridiconfulti, or lawyers, to work upon the same. These, accordingly, took out the best and finest decisions from the two thousand volumes of the ancient juridiconfulti, and reduced them all into one body; which was published in the year 533, under the name of the Digest. To this the emperor gave the force of a law, by a letter at the head of the work, which serves it as a preface.

The Digest makes the first part of the Roman law, and the first volume of the corpus or body of the civil law, contained in fifty books. It was translated into Greek under the same emperor, and called Pandecta. See Pandects.

Cujus says, that Digest is a common name for all books digested in a good order and economy; and hence it is that Terullian calls the Gospel of St Luke a Digest.

Hence also abridgements of the common law are denominated digests of the numerous cases, arguments, readings, pleadings, &c. dispersed in the year-books, and other reports and books of law, reduced under proper heads or common places. The first was that of Statham, which comes as low as Henry VI. That of Fitzherbert was published in 1516; Brook's in 1573, of which Hughes's, published in 1603, is a sequel. Rolls, Danvers, and Nelifon, have also published Digests or abridgements of this kind, including the cases of later days; to which may be added the New Abridgement, Viner's Abridgement, &c.

DIGESTION, in medicine, is the solution of the aliments into such minute parts as are fit to enter the lachet vessels, and circulate with the mabs of blood. See Anatomy, &c. 102.

DIGESTION, in chemistry, is an operation which consists in exposing bodies to a gentle heat, in proper vessels, and during a certain time. This operation is very useful to favour the action of certain substances upon each other; as, for example, of well calcined, dry, fixed alkali upon rectified spirit of wine. When these two substances are digested together in a matras, with a gentle sand-bath heat, the spirit of wine acquires a yellow-redish colour, and an alkaline quality. The spirit would not so well acquire these qualities if stronger and fiercer medicines were used.

DIGESTIVE, in medicine, such remedies as strengthen and increase the tone of the stomach, and assist in the digestion of foods. To this class belong all stomachics and strengtheners or corroboration.

DIGESTION, in surgery, denotes a sort of unguent, platter, or the like, that ripens and prepares the matter of wounds, &c. for suppuration.

DIGGING, among miners, is appropriated to the operations of freeing any kind of ore from the bed or stratum in which it lies, where every stroke of their tools turns to account: in contradistinction to the openings made in search of such ore, which are called hatches, or essay-hatches; and the operation itself, tracing of mines, or hatching.

When a bed of ore is discovered, the people, so called from the instrument they use, which is a kind of pick-ax, free the ore from the strata around it; and the hovel-men throw it up from one shamble to another, till it reaches the mouth of the hatches.

In some mines, to save the expense as well as fatigue of the hovel-men, they raise the ore by means of a winch and two buckets, one of which goes up as the other comes down.

DIGIT.
DIGIT, in astronomy, the twelfth part of the diameter of the sun or moon, used to express the quantity of an eclipse. Thus an eclipse is said to be of six digits, when six of these parts are hid.

DIGITS, or Mundaei, in arithmetic, signify any integer under 10: viz. 1, 2, 3, 4, 5, 6, 7, 8, 9.

DIGIT is also a measure taken from the breadth of the finger. It is properly this of an inch, and contains the measure of four barley-corns laid breadthwise. Nobility only can give so high a digit, and in the natural method ranking under the 28th order, Liride. The calyx is quinquepartite; the corolla campanulated, quinquelocular, and ventricose; named by the botanist, is much commended by some physicians for its medicinal properties.

DIGITALIS, fox-glove: A genus of the angiosperma order, belonging to the didynamia class of plants; and in the natural method ranking under the 28th order, Liride. The calyx is quinquepartite; the corolla campanulated, quinquelocular, and ventricose; the capsule ovate and bilocular. There are six species; five of which are hardy, herbaceous, biennial, and perennial plants, and the sixth a tender shrubby exotic. The herbaceous species raise two or three feet high, crowned with spikes of yellow iron-coloured or purple flowers. The shrubby fox-glove rises five or six feet high, having spear-shaped rough leaves, four or five inches long, and half as broad; the branches being all terminated with flowers growing in loose spikes. All the species are easily raised by seeds. An ointment made of the flowers of purple fox-glove and May-butter, is much commended by some physicians for coryphalous ulcers which run much and are full of matter. Taken internally, this plant is a violent purgative and emetic; and is therefore only to be administered to robbed constitutions. The country people in England frequently use a decoction of it with poppy of the oak in epileptic fits. An infusion of two drams of the leaves is a very pleasant drink. It is a good medicine for the stomach.

DIGITated, among botanists. See BoFANy, p. 445, 162. and Plate CV. fig. 122.

DIGLYPH, in architecture, a kind of imperfect triglyph, confide, or the like; with two channels or engravings, either circular or angular.

Digne, an episcopal town of Provence in France, famous for the baths that are near it. It is seated on a river called Marderic, in E. Long. 5° 27'. N. Lat. 44° 45'.

DIGNITARY, in the canon law, a person who holds a dignity, that is, a benefice which gives him some pre-eminence over mere priests and canons. Such is a bishop, dean, arch-deacon, prebendary, &c.

Dignity, as applied to the titles of noblemen, signifies honour and authority. And dignity may be divided into superior and inferior; as the titles of duke, marquis, baron, &c. are the highest names of dignity; and those of baronet, knight, serjeant at law, &c. the lowest. Nobility only can give so high a name of dignity as to supply the want of a surname in legal proceedings; and as the omission of a name of dignity may be pleaded in abatement of a writ, &c. it may be where a peer has more than one name of dignity, is not named by the Moft Noble. No temporal dignity of any foreign nation can give a man a higher title here than that of esquire.

Dignity, in the human character, the opposite of meaness.

Man is endued with a sense of the worth and excellence of his nature: he deems it more perfect than that of the other beings around him; and he perceives that the perfection of his nature consists in virtue, particularly in virtues of the highest rank. To express that sense, the term dignity is appropriated. Further, to behave with dignity, and to refrain from all mean actions, is felt to be, not a virtue only, but a duty; it is a duty every man owes to himself. By acting in that manner, he attains love and esteem: by acting meanly, or below himself, he is disapproved and censured.

This sense of the dignity of human nature reaches even our pleasures and amusements. If they enlarge the mind by raising grand or elevated emotions, or if they humanize the mind by exercising our sympathy, they are approved as suited to the dignity of our nature: if they contract the mind by fixing it on trivial objects, they are censured as not suited to the dignity of our nature. Hence, in general, every occupation, whether of use or amusement, that corresponds to the dignity of man, is termed manly; and every occupation below his nature, is termed childish.

To those who study human nature, there is a point which has always appeared intricate: How comes it that generosity and courage are more esteemed, and bel ow more dignity, than good-nature, or even justice; though the latter contribute more than the former to private as well as to public happiness? This question, bluntly propounded, might puzzle even a philosopher; but, by means of the foregoing observations, will easily be solved. Human virtues, like other objects, obtain a rank in our estimation, not from their utility, which is a subject of reflection, but from the direct impression they make on us. Justice and good-nature are a sort of negative virtues, that scarce make any impression but when they are transfixed: courage and generosity, on the contrary, producing elevated emotions, enliven greatly the sense of a man's dignity, both in himself and in others; and for that reason, courage and generosity are in higher regard than the other virtues mentioned: we describe them as grand and elevated, as of greater dignity, and more praiseworthy.

This leads us to examine more directly emotions and passions with respect to the present subject: and if it will not be difficult to form a scale of them, beginning with
Dignity.

Dignity, the meanest, and ascending gradually to that of the highest rank and dignity. Pleasure felt as at the organ of sense, named corporeal pleasure, is perceived to be low; and when indulged to excess, is perceived also to be mean: for that reason, persons of any delicacy dissemble the pleasure they take in eating and drinking. The pleasures of the eye and ear, having no organic feeling, and being free from any sense of meanliness, are indulged without any flame: they even rise to a certain degree of dignity and when their objects are grand or elevated. The same is the case of the sympathetic passions: a virtuous person behaving with fortitude and dignity under cruel misfortunes, makes a capital figure; and the sympathising spectator feels in himself the same dignity. Sympathetic diisorders at the same time never is mean: on the contrary, they are warm it animates the mind; but it is not accompanied with dignity, unless when founded on the more elevated internal properties, and is mean. Joy, contempt, and admiration, which, in point of dignity, are considered as general theorems, afford entertainment and dignity under cruel misfortunes, and dignify the sensor.

Pleasure occupies a high rank in point of dignity. The rank that love possesses in the scale, depends in a great measure on its object; it possesses a low place when founded on external properties; and is mean when bestowed on a person of inferior rank without any extraordinary qualification: but when founded on the more elevated internal properties, it assumes a considerable degree of dignity. The same is the case of friendship. When gratitude is warm it animates the mind; but it scarce rises to dignity. Joy beows dignity when it proceeds from an elevated cause.

If we can depend upon induction, dignity is not a property of any disagreeable passion; one is light, another severe; one depresses the mind, another animates it; but there is no elevation, far less dignity, in any of them. Revenge, in particular, though it enflames and swells the mind, is not accompanied with dignity, not even with elevation: it is not however felt as mean or groveling, unless when it takes indirect measures for gratification. Shame and remorse, though they sink the spirits, are not mean. Pride, a disagreeable passion, bestows no dignity in the eye of a spectator. Vanity always appears mean; and extremely so where founded, as commonly happens, on trivial qualifications.

We proceed to the pleasures of the understanding, which possess a high rank in point of dignity. Of these every one is felicitous, and when he considers the important truths that have been laid open by science; such as general theorems, and the general laws that govern the material and moral worlds. The pleasures of the understanding are suited to man as a rational and contemplative being, and they tend not a little to ennoble his nature; even to the Deity he stretches his contemplations, which, in the discovery of infinite power, wisdom, and benevolence, afford delight of the most exalted kind. Hence it appears, that the fine arts, studied as a rational science, afford entertainment of great dignity; superior far to what they afford as a subject of taste merely.

But contemplation, however in itself valuable, is chiefly respected as sublimer to action; for man is intended to be more an active than a contemplative being. He accordingly shows more dignity in action than in contemplation: generosity, manannimity, heroism, raise his character to the highest pitch: these best express the dignity of his nature, and advance him nearer to dignity than any other of his attributes.

Having endeavored to assign the efficient cause of dignity and meaneness, by unfold the principle on which they are founded, we proceed to explain the final cause of the dignity or meaneness bestowed upon the several particulars abovementioned, beginning with corporeal pleasures. Thefe, as far as useful, are, like justice, fenced with sufficient functions to prevent their being neglected; hunger and thirst are painful sensations, and we are incited to animal love by a vigorous propensity: were corporeal pleasures dignified over and above with a place in a high class, they would infalubrily overturn the balance of the mind, by outweigbing the social affections. This is a satisfactory final cause for refusing to these pleasures any degree of dignity: and the final cause is not less evident of their meannesse when they are indulged to excess. The more refined pleasures of external sense, conveyed by the eye and ear from natural objects and from the fine arts, deserve a high place in our esteem, because of their singular and extensive utility: in some cases they rise to a considerable dignity; and the very lowest pleasures of the kind are never esteemed mean or groveling. The pleasure arising from wit, humour, ridicule, or from what is simply ludicrous, is useful, by relaxing the mind after the fatigue of more manly occupation: but the mind, when it surrenders itself to pleasure of that kind, loses its vigour, and sinks gradually into sloth. The place this pleasure occupies in point of dignity, is adjudged to these views: to make it useful as a relaxation, it is not branded with meannesse; to prevent its usurpation, it is removed from that place but a single degree: no man values himself for that pleasure, even during gratification; and if it have engrossed more of his time than is requisite for relaxation, he looks back with some degree of blame.

In point of dignity, the social emotions rise above the selfish, and much above those of the eye and ear; man is by his nature a social being; and to qualify him for society, it is wisely contrived, that he should value himself more for being social than selfish.

The excellency of man is chiefly discernible in the great improvements he is susceptible of in society: these by perseverance, may be carried on progressively, above any assignable limits; and even abstractive from revelation, there is great probability, that the progress begun here will be completed in some future state. Now, as all valuable improvements proceed from the exercise of our rational faculties, the Author of our nature, in order to excite us to a due use of these faculties, hath assigned a high rank to the pleasures of the understanding; their utility, with respect to this life as a well as a future, intitles them to that rank.

But as action is the aim of all our improvements, virtuous actions justly possess the highest of all the ranks. These, we find, are by nature distributed into different classes, and the first in point of dignity assigned to actions that appear not the first in point of use: generosity for example, in the sense of mankind, is more respected than justice, though the latter is undoubtedly more essential to society; and magnanimity, heroism,
Dignity

Dignity, in oratory, is one of the three parts of general eloquence; and consists in the right use of tropes and figures. See Oratory, p. 48.

Digon, an ancient, handsome, rich, and very considerable town of France; capital of Burgundy, and of the Dignon: with a parliament, bishop's see, a mint, an university, academy of sciences, an abbey, and a cathedral; most part of the churches and public structures are very beautiful, and in one of the squares there is an equetrian statue of Louis XIV. It is seated in a very pleasant plain between two small rivers, which produces excellent wine. E. Long. 5. 7. N. Lat. 47. 19.

Dignerse, fervices, ftrictly speaking, are of different things, which, however, may be of service to the good of the state; thefe were Janus, Saturn, the Genius, Turges, &c. See ORATORY, p. 47.

Dilatation, in anatomy, a name given to several muscles in the human body. See Anatomy, Table of the Muscles.

Dilatory, in law, are such as are put in
DIM in botany: A genus of the monogy- 

nia order, belonging to the triandria clas of plants. There is no calyx; the corolla has 

DIMENSION, in geometry, is either length, 

breadth, or thicknes; hence, a line hath one di-

mension, viz. length; a superficies two, viz. 

length, breadth; and a body, or solid, has three, viz. 

DIMENSION in architecture, a contraction of 

the upper part of a column, by which its diameter is 

made left than that of the lower part*. 

DIMINUTIVE, in grammar, a word formed from 

some other, to soften or diminish the force of it, 

or to signify a thing is little in its kind. Thus, 

cellule is diminutive of cell, globule of globes, hillock of hill.

DIMISSORY LITTERS, Literæ Dimissoria, in the 

canon law, a letter given by a bishop to a candidate for 

holy orders, having a title in his diocese, directed to 

some other bishop, and giving leave for the bearer to 

be ordained by him.

When a person produces letters of ordination or 

tonsure, conferred by any other than his diocesan, 

he must at the same time produce the letters dimissory 

given by his own bishop, on pain of nullity.

Letters dimissory cannot be given by the chapter, 

(DINOCRATES, a celebrated architect of 

Macedonia, who rebuilt the temple of Epheus, when burnt 

by Erostratus, with much more magnificence than be-

fore
Vitruvius informs us that Dinocrates proposed to Alexander the Great to convert mount Athos into the figure of a man, whose left hand should contain a walled city, and all the rivers of the mount flow into his right, and from thence into the sea! He also conceived a scheme for building the dome of the temple of Arisino at Alexandria, of loadstone; that should by its attraction uphold her iron image in the centre, suspended in the air! Projects which at least showed a vast extent of imagination.

DIO CHRYSTOPHOM, that is, Golden Mouth, a celebrated orator and philosopher of Greece, in the first century, was born at Prusa in Bithynia. He attempted to receive a scheme for building the dome of the temple in suspen
ded in the air! Ardinoe it

There are other of his works: the Dio's orations, and some

There are Dio's orations, and some

DIOCLESIANUS (Caius Valerius Jovius), a celebrated Roman emperor born of an obscure family in Dalmatia in 245. He was first a common soldier, and by merit and success he gradually rose to the office of a general; and at the death of Numerian in 284 he was invested with imperial power. In this high station he reaped the virtues and fidelity of Maximian, who had shared with him all the subordinate offices in the army, by making him his colleague on the throne. He created two subordinate emperors Constantius and Galerius, whom he called Ceasars, whilst he claimed for himself and his colleague the superior title of Augustus. Dioclesian has been celebrated for his military virtues: and though he was naturally unpolished by education and study, yet he was the friend and patron of learning and true genius. He was bold and resolute, active and diligent, and well acquainted with the arts, which will endanger sovereignty to his people, and make him respectable even in the eyes of his enemies. His cruelty, however, against the followers of Christi
dianity, has been severely branded with infamy. After he had reigned 22 years in the greatest prosperity, he publicly abdicated the crown at Nicomedia in 305, and retired to a private station at Salona. Maximian his colleague followed his example, but not from voluntary choice; and when he some time after endeavoured to rout the ambition of Dioclesian, and persuade him to re-assume the imperial purple, he received for answer, that Dioclesian took now more delight in cultivating his little garden than he formerly enjoyed in a palace, when his power was extended over all the earth. He lived nine years after his abdication in the greatest security and enjoyment at Salona, and died in 314, in the 68th year of his age. Dioclesian is the first sovereign who voluntarily resigned his power. His bloody persecutions of the Christians forms a chronological era, called the era of Dioclesian, or of the martyrs. It was for a long time in use in the theological writings, and is still followed by the Copts and Abyssinians. It commenced August 29, 284.

DIOCTAHEDRIA, in natural history, a genus of pellucid and crystalliform spars, composed of two octan
gular pyramids, joined base to base, without any intermediate column. Of these some have long pyramids, others short and sharp-pointed ones, and others short and obtuse-pointed ones; the two former species being found in the Hartz-forest, and the last in the mines of Cornwall.

DIODATI (John), a famous minister, and professor of theology at Geneva, was born at Lucoa in 1579, and died at Geneva in 1652. He is distinguished by translations, 1. of the Bible into Italian, with notes, Geneva 1607, 400. The best edition at Geneva in 1641, folio. This is said to be more a paraphrase than a translation, and the notes rather divine meditations than
Diodorus, an historian, surnamed Siculus, because he was born at Argrya in Sicily. He wrote an history of Egypt, Persia, Syria, Media, Greece, Rome, and Carthage; and it is said that he visited all the places of which he has made mention in his history. It was the labour of 30 years. He is, however, too credulous in some of his narrations, and often wanders far from the truth. He often dwells too long upon fabulous reports and trifling incidents; while events of the greatest importance to history are treated with brevity, and sometimes passed over in silence. He lived in the age of J. Caesar and Augustus; and spent much time at Rome to procure information, and authenticate his historical narrations. This important work, which he composed in Greek, contained 40 books, of which there are only 15 remaining. The style is clear and neat, and very suitable to history. The best edition is that of Amsterdam, 1743, in 2 vols. folio.

DIOCLES (from διας twice, and σεις a house or habitation) two houses. The name of the 22d clas in Linnaeus's sexual method, consisting of plants, which having no hermaphrodite flowers, produce male and female flowers on separate roots. These latter only ripen seeds; but require for that purpose, according to the sexalists, the vicininity of a male plant; or the apersion, that is, sprinkling, of the male dust. From the seeds of the female flowers are raised both male and female plants. The plants then in the clavis dioecia are all male and female; not hermaphrodite, as in the greater number of classes; nor with male and female flowers upon one root, as in the clavis monoeica of the same author. See Botany, p. 450.

DIOGENES of Apollonia, in the island of Crete, held a considerable rank among the philosophers who taught in Ionia before Socrates appeared at Athens. He was the scolar and successor of Anaximenes, and in some measure rectified his master's opinion concerning air being the cause of all things. It is said, that he was the first who observed that air was capable of condensation and rarefaction. He passed for an excellent philosopher, and died about the 450th year before the Christian era.

DIOGENES the Cynic, a famous philosopher, was the son of a banker of Sinope in Pontus. Being baffled with his father for coinage false money, he retired to Athens, where he founded philosophy under Antisthenes. He added new degrees of austerity to the code of the Cynics, and never did any philosopher carry so far a contempt for the conveniences of life. He was one of those extraordinary men who run every thing to extremity, without excepting even reason itself; and who confirm the saying, that "there is no great genius without a tincture of madness." He lodged in a tub; and had no other moveables besides his staff, wallet, and wooden bowl, which last he threw away on seeing a boy drink out of the hollow of his hand. He used to call himself a vagabond, who had neither house nor country: was obliged to beg, was ill clothed, and lived from hand to mouth: and yet, says Helian, he took as much pride in these things as Alexander could in the conquest of the world. He was not indeed a lot more humble than those who are clothed in rich apparel, and fare sumptuously every day. He looked down on all the world with scorn; he magnificently confounded all mankind, and thought himself unquestionably superior to all other philosophers. Alexander one day paid him a visit.
Diogenes. a viti, and made him an offer of riches or any thing else: but all that the philosopher requested of him was, to stand from betwixt the sun and him. As if he had said, "Do not deprive me of the benefits of nature, and I leave to you those of fortune." The conqueror was so affceted with the vigour and elevation of his soul, as to declare, that "if he was not Alexander, he would choose to be Diogenes;" that is, if he was not in possession of all that was pompous and splendid in life, he would, like Diogenes, heroically despise it. Diogenes had great presence of mind, as appears from the jests of his contemporaries, and his wit. He had his house at Corinth, was taken by pirates, who carried him into the sea to command men; but Alexander, for that was the Corinthian's name, bought him, as people obey their governors and physicians. Some say, that Diogenes spent the remainder of his life in Xeniaides's family; but Dion Chrysostom afferts, that Diogenes, and carried him with him to Corinth. He appointed him tutor to his children, and entrusted him also with the management of the house. Diogenes's friends being desirous of redeeming him, "You are fools, (said he); the lions are not the slaves of those who feed them, but they are the servants of the lions." He therefore plainly told Xeniaides, that he ought to obey him, as people obey their governors and physicians. Some say, that Diogenes spent the remainder of his life in Xeniaides's family; but Dion Chrysostom afferts, that he passed the winter at Athens, and the summer at Corinth. He died at Corinth when he was about 90 years old; but authors are not agreed either as to the time or manner of his death. The following account, Jerom says, is the true one. As he was going to the Olympic games, a fever seized him in the way; upon which he lay down under a tree, and refused the affistance of those who accompanied him, and who offered him either a horse or a chariot. "Go you to the games, (says he), and leave me to contend with my illness. If I conquer, I will follow you: if I am conquered, I shall go to the shades below." He dispatch-ed himself that very night; saying, that "he did not go properly die, as get rid of his fever." He had for his discipiles Onecriites, Phocion, Stilpo of Megara, and several other great men. His works are lost.

Diogenes Laertius, so called from Laerta in Cilicia where he was born, an ancient Greek author, who wrote ten books of the Lives of the Philosophers, still extant. In what age he flourished, is not easy to determine. The oldest writers who mention him are Sopater Alexandrinus, who lived in the time of Constantine the Great; and Helychius Miletus, who lived under Julian. Diogenes often speaks in terms of approbation of Plutarch and Phavorinus; and therefore, as Plutarch lived under Trajan, and Phavorinus under Hadrian, it is certain that he could not flourith before the reigns of those emperors. Menage has fixed him to the time of Severus; that is, about the year of Christ 200. From certain expressions in him some have fancied him to have been a Christian; but, as Menage observes, the immoderate praises he bestows upon Epicurus will not suffer us to believe this, but incline us rather to suppose that he was an Epicurean.

He divided his Lives into books, and inscribed them to a learned lady of the Platonic school, as he himself intimates in his life of Plato. Montaigne was so fond of this author, that instead of one Laertius he wishes we had a dozen: and Voluemsays, that his work is as precious as gold. Without doubt we are greatly obliged to him for what we know of the ancient philosophers; and if he had been as exact in the writing part, as he was judicious in the choice of his subject, we had been more obliged to him still. Bishop Burnet, in the preface to his Life of Sir Matthew Hale, speaks of him in the following proper manner: "There is no book the ancients have left us (says he), which might have informed us more than Diogenes Laertius's Lives of the Philosophers, if he had had the art of writing equal to that great subject which he undertook: for if he had given the world such an account of them as Gaisfendus has done of Peirce, how great a flock of knowledge might we have had, which by its skillfulness is in a great measure lost! since we must now depend only on him, because we have no other and better author who has written on that argument." There have been several editions of his Lives of the Philosophers; but the best is that printed in two volumes 4to, at Amsterdam, 1693. This contains the advantages of all the former, besides some peculiar to itself: the Greek text and the Latin version corrected and amended by Melbomius; the entire notes of Henry Stephens, both the Categorons, and of Menage; 24 copper-plates of philosophers elegantly engraved: to which is added, The History of the Female Philosophers, written by Menage, and dedicated to Madame Dacier. Besides this, Laertius wrote a book of Epigrams upon illustrious Men, called Pammetius, from its various kinds of metre: but this is not extant.

DIOMEDIA, in ornithology, a genus belonging to the order of anseres. The bill is irrat; the superior mandible is crooked at the point, and the lower one is truncated; the nostrils are oval, open, a little prominent, and placed on the sides. There are two species, viz. 1. The exulans, has pennisated wings, and three toes on each foot. It is the albatross of Edwards; and is about the size of a pelican. These birds are found in the ocean between the tropics and at the Cape of Good Hope. They are also often found in vast flocks in Kamtschatka, and adjacent islands, about the end of June, where they are called Great Gulls; but it is chiefly in the bay of Penchinen, the whole inner sea of Kamtschatka, the Kurilelefs, and that of Bering; for on the eastern coast of the first they are scarce, a single straggler only appearing now and then. Their chief motive for frequenting these places seems to be plenty of food; and their arrival is asure preriage of fhoals of fih following. At their first coming they are very lean, but soon grow immeinently fat. Are very voracious birds, and will often swallow a salmon of four or five pounds weight; but as they cannot take the whole of it into their stomachs at once, part of the tail end will often remain out of the mouth; and the natives, finding the bird in this situation, make no difficult matter of knocking it on the head on the spot. Before the middle of August
Diomedes, Augustus, the great general who migrated elsewhere. They are often taken by means of a hook baited with a fish; but it is not for the sake of their flesh that they are valued, being hard and unfavourable, but on account of the interlenses, a particular part of which they blow up as a bladder, to serve as floats to buoy up their nets in fishing. Of the bones they make tobacco-pipes, needle-cases, and other useful things. When caught they defend themselves stoutly with the bill. Their cry is harsh and disagreeable, not unlike the braying of an ass. The breeding places of the albatrosses, if at all in the northern hemisphere, have not yet been pointed out; but we are certain of their multiplying in the southern, viz. Patagonia and Falkland islands: to this last place they come about the end of September or beginning of October, among other birds, in great abundance. The nests are made on the ground with earth, are round in shape, a foot in height, indented at top. The egg larger than that of a goose, four inches and a half long, white, marked with dull spots at the bigger end; and is thought to be good food, the white never growing hard with boiling. While the female is sitting, the male is constantly on the wing, and supplies her with food; during this time they are so tame as to suffer themselves to be hove off the nest while their eggs are taken from them; but their chief destruction arises from the hawk, which, the moment the female gets off the nest, darts after them. This bird attacks it on all sides, but particularly the wing by the dark grey gull called fixed. This bird is remarkable for the tameness with which they approach the Greeks, and for the swans. Thefe birds took possession, and hatch their young in their nests, which, the moment the female gets off the nest, darts after them, and flies away with the egg. The albatrosses itself likewise has its enemy, being pursued all around by the black gull called fixed, or, according to a certain tradition, he was perished by the hand of his father-in-law. His death was greatly lamented by his companions, who in the excess of their grief were changed into birds resembling swans. These birds took flight into a neighboring island in the Adriatic, and became remarkable for the tawny eyes of the tyrants, which they shunned all other nations. They are called the birds of Diomedes. Altars were raised to Diomedes, as a god, one of which Strabo mentions at Timavus.

DION, a Syracusan, son of Hipparinus, famous for his power and abilities. He was related to Dionysius. He became remarkable for his uncommon popularity. He entered the port of Syracuse, and landed in Attica, where his fame spread. He was called Califerates, or Callippus, 354 years before the Christian era.

DIOMEDES, son of Tydeus and Deiphyle, was king of Æolia, and one of the bravest of the Grecian chiefs in the Trojan war. He often engaged Hector and Æneas, and obtained much military glory. He went with Ulysses to steal the Paladium from the temple of Minerva in Troy; and affisted in murdering his own uncle, the king of Thessaly, and carrying away his horses. At his return from the siege of Troy, he left his way in the penguins. He then landed in Attica, where his companions plundered the country and left the Trojan Palladium. During his long absence, his wife Ægiale forgot her marriage vows, and prostituted herself to Cometes one of her servants. This lasciviousness of the queen was attriuted by some to the refentment of Venus, whom Diomedes had severely wounded in a battle before Troy. The infidelity of Ægiale was highly displeasing to Diomedes. He resolved to abandon his native country which was the seat of his disgrace; and the attempts of his wife to take away his life, according to some accounts, did not a little contribute to hasten his departure. He came to that part of Italy which has been called Magna Graecia, where he built a city, which he called Argirrippa, and married the daughter of a king of the country. He died there in extreme old age; or, according to a certain tradition, he perished by the hand of his father-in-law. His death was greatly lamented by his companions, who, in the excess of their grief, were changed into birds resembling swans. These birds took flight into a neighboring island in the Adriatic, and became remarkable for the tawny eyes of the tyrants, which they shunned all other nations. They are called the birds of Diomedes. Altars were raised to Diomedes, as a god, one of which Strabo mentions at Timavus.
arrival of Æneas in Italy, down to the reign of the emperor Alexander Severus. The 34 first books are totally lost, the 20 following, that is from the 35th to the 54th, remain entire, the six following are mutilated, and fragments is all that we possess of the last 20.

In the compilation of this extensive history, Dion professed himself Thucydides for a model, but he is not perfectly happy in his imitation. His style is pure and elegant, and his narrations are judiciously managed, and his reflections learned; but upon the whole, he is credulous, and the begotten slave of partiality, satyr, and flattery. He inveighs against the republican principles of Brutus and Cicero, and extols the cause of Caesar. Seneca is the object of his satyr, and he represents him as debauched and licentious in his morals.

DIONIS (Peter), a famous surgeon, born at Paris, distinguished himself by his skill in his profession, and by his works; the principal of which are, 1. A course of operations in surgery; 2. The anatomy of man; and, 3. A treatise on the manner of afflicting women in child-birth. He died in 1718.

DIONEEA MUSCIPULA, or Venus's Fly-trap, in botany, a newly discovered sensitive plant.

Every one skilled in natural history knows, that the mono fists, or sensitive plants, clothe their leaves, and bend their joints, upon the least touch: and this has astonished us; but no end or design of nature has yet appeared to us from these surpring motions: they soon recover themselves again, and their leaves are expanded as before. But the plant we are now going to describe, shows that nature may have some view towards its nourishment, in forming the upper joint of its leaf like a machine to catch food; upon the middle of this lies the bait for the unhappy insect that becomes its prey. Many minute red glands that cover its inner surface, and which perhaps discharge some sweet liquor, tempt the poor animal to them; and the instant these tender parts are irritated by its feet, the two lobes rise up, grasp it fast, lock the two rows of spines together, and squeeze it to death. And further, least the strong efforts for life, in the creature thus taken, should serve to disengage it, three small erect spines are fixed near the middle of each lobe among the glands, that effectually put an end to all its struggles. Nor do the lobes ever open again, while the dead animal continues there. But it is nevertheless certain, that the plant cannot distinguish an animal from a mineral substance; for, if we introduce a straw or a pin between the lobes, it will grasp it full as fast as if it was an insect. —The plant is one of the monogynia order, belonging to the deciduaria class. It grows in America, about 35 deg. N. Lat. in wet shady places, and flowers in July and August. The largest leaves are about three inches long, and an inch and a half across the lobes; the glands of those exposed to the sun are of a beautiful red colour; but those in the shade are pale, and inclining to green. The roots are famous, lending forth but few fibres, and are perennial. The leaves are numerous, inclining to bend downwards, and are placed in a circular order; they are jointed and succulent; the lower joint, which is a kind of flalk, is flat, longish, two-edged, and inclining to heart-shaped. In some varieties they are serrated on the edges near the top. The upper joint consists of two lobes; each lobe is of a semi-oval form, with their margins furnished with stiff hairs like eye-brows, which embrace or lock in each other when they close; this they do when they are inwardly irritated. The upper surfaces of these lobes are covered with small red glands; each of which appears, when highly magnified, like a compressed arbutus berry. —Among the glands about the middle of each lobe, are three very small erect spines. When the lobes incline any substance, they never open again while it continues there. If it can be showed out to as not to (train the lobes, they expand again; but if force is used to open them, so strong has nature formed the spring of their fibres, that one of the lobes will generally snap off rather than yield. The stalk is about six inches high, round, smooth, and without leaves; ending in a spike of flowers. The flowers are milk-white, and stand on footstalks, at the bottom of which is a little painted bractea or flower-leaf. The foil in which it grows, is a black, light, mould, intermixed with white sand. Being a swamp plant, a north-east aspect will be proper for it at first, to keep it from the direct rays of the sun; and in winter, in cold climates where it is not a native, it will be necessary to shelter it with a bell glafs, such as is used for melons. This should be covered with straw or a mat in hard frosts. By this means several of these plants have been preserved through the winter in a very vigorous state. Its sensitive quality will be found in proportion to the heat of the weather, as well as the vigour of the plant.

DIONYSIA, in Grecian antiquity, solemnities in honour of Bacchus, sometimes called by the general name of Orgia; and by the Romans Bacchanalia, and Libation. See Bacchanalia and Bacchus.

DIONYSIACA, in antiquity, was a denomination given to plays and all manner of sports acted on the stage; because play-boys were dedicated to Dionysius, i.e. Bacchus, and Venus, as being the deities of sports and pleasure.

DIONYSIAN PERIOD. See Chronology, No. 31.

DIONYSIUS I. from a private secretary became general and tyrant of Syracuse and all Sicily. He was likewise a poet; and having, by bribes, gained the tragedy-prize at Athens, he indulged himself in immoderately at table from excess of joy, that he died of the debauch, 386 B.C. But some authors relate that he was poisoned by his physicians.

DIONYSIUS II. (his son and successor) was a great tyrant than his father; his subjects were obliged to apply to the Corinthians for succour: and Timoleon their general having conquered the tyrant, he fled to Athens, where he was obliged to keep a school for subsistence. He died 343 B.C.

DIONYSIUS (Halicarnassensis), a celebrated historian, and one of the most judicious critics of antiquity, was born at Halicarnassus; and went to Rome after the battle of Actium, where he lived 22 years under the reign of Augustus. He there composed in Greek his History of the Roman Antiquities, in 20 books, of which the first 11 only are now remaining. There are also still extant several of his critical works. The best edition of the works of this author is that of Oxford,
THAT part of Optics which treats of the laws of refraction, and the effects which the refraction of light has in vision. The word is originally Greek, formed of συν φορ = "through," and οινον = "light.

As this and the other branches of Optics are fully treated under the collective name, we shall here:
1. Just give a summary of the general principles of the branch, in a few plain syllogisms, with some preliminary definitions; and, 2. Prefent our readers with a few of entertaining experiments illustrative of or dependent upon, those principles.

DEFINITIONS.
1. When a ray of light passing out of one medium into another of a different density, is turned from that straight line in which it would otherwise proceed into one of a different direction, it is said to be refracted.

Thus the rays AB, AC, &c. by falling in air into the glass BGC, are turned from their natural course into that of BF, CF, &c. and are therefore said to be refracted by the lens BGC.

2. Any spherical transparent glass, that converges and right-angled triangles, &c. the nature of which was determined by Diophantus, a mathematician of Alexandria, who is believed to have lived about the third century. We have his works, which were published with notes at Paris, in 1621, by Bachet de Mezieres; and another edition in 1670, with observations on every question, by M. Fermat.

In these questions it is endeavoured to find commendurable numbers to answer indeterminate problems; which bring out an infinite number of incommensurable quantities. For example, it is proposed to find a right-angled triangle, whose sides x, y, z, are expressible by commensurable numbers: it is known that x + y + z = x being the supposed hypotenuse. But it is possible to assume x and y, so that z will be incommensurable; for if x = 1, and y = 2, and z = \sqrt{3}.

The art of resolving such problems consists in finding the unknown quantity or quantities in such a manner, that the square or higher power may vanish out of the equation, and then be the result of the unknown quantity in its first dimension, the equation may be resolved without having recourse to incommensurables; e.g. let it be supposed to find x, y, z, the sides of a right-angled triangle, such as will give x + y + z = x. Suppose x = 1, and y = 1, and z = \sqrt{2} + 1. If z = 1, and y = 1, then the right side will equal the sum of the left side, and the quantities under the square root must be equal to the square root of the sum of the squares of the previous quantities.

Suppose x = 1, and y = 1, and z = \sqrt{2} + 1. If z = 1, and y = 1, then the right side will equal the sum of the left side, and the quantities under the square root must be equal to the square root of the sum of the squares of the previous quantities.

In a spherical transparent glass, the rays of light passing through it, diverge or converge. The angle of refraction at the lens is the angle of incidence; and the distance between the line BD and the perpendicular EF, is called the angle of refraction.
DIOPTRICS.

APHORISMS.

1. A ray of light passing obliquely out of one medium into another that is denser, will be refracted toward the perpendicular; as the ray AB, by passing out of air into glass, is refracted into BF, inclined to the perpendicular AF. On the contrary, a ray passing out of a denser into a rarer medium, will be refracted from the perpendicular; as the ray BC, passing out of the glass GH into air, is refracted into DI.

2. The sines of the angles of incidence and refraction, when the lines that contain them are all equal, will have a determinate proportion to each other, in the same mediums: which between air and water will be as 4 to 3; between air and glass, as 3 to 2, nearly; and in other mediums in proportion to their densities.

3. Any object viewed through a glass, whose two surfaces are parallel, will appear of its natural shape and dimensions, provided it be only of the size of the pupil of the eye, and the light proceeding from it be received directly through the glass by one eye only. In all other situations an alteration will be perceived not only in its apparent situation, but its dimensions also. This alteration will be greater in proportion to the thickness of the glass, and the obliquity of the rays; in general, it is so small as to be overlooked.

4. All the rays of light which fall upon a convex lens, whether parallel, converging, or diverging to a certain degree, will be made to meet in a focus on the other side; but if they diverge excessively, they will not do so. Thus if rays diverge from a point placed before the glass, at the focal distance from it, they will become parallel after passing through it; and if the point from which they proceed be nearer the glass than its focal distance, they will still continue to diverge, though in a lesser degree than before.

5. When parallel rays fall upon a concave lens, they will be made to diverge after passing through it. If they are diverging already before they fall upon the glass, they will diverge more after passing through it; or even if they are converging to a certain degree, they will diverge upon passing through a concave lens; but if the convergence is very great, they will converge after passing through the glass, though to a more distant point than that at which they would otherwise have met.

6. When an object is viewed through two convex lenses, its apparent diameter ought to be to its real one as the distance of the focus of the object-glass is to that of the eye-glass; but by reason of the aberration of the rays of light, the magnifying power will be somewhat greater or less in proportion to the diameter of the object.

By these aphorisms we are enabled to account for the various effects of dioptric machines, as refracting telescopes, microscopes, the camera obscura, &c. See Optics.

ENTERTAINING EXPERIMENTS.

I. Optical Illusions.

On the bottom of the vessel ABCD, place three pieces of money, as a shilling, a half-crown, and crown; the first at E, the second at E, and the left at G. Then place a peron at H, where he can see no further into the vessel than I: and tell him, that by pouring water into the vessel he will make him see three different pieces of money; bidding him observe carefully whether any money goes in with the water.

Here you must observe to pour in the water very gently, or contrive to fix the pieces, that they may not move out of their places by its agitation.

When the water comes up to K, the piece at E will become visible; when it comes up to L, the pieces at E and F will appear; and when it rises to M, all the three pieces will be visible.

From what has been said of the refraction of light, the cause of this phenomenon will be evident: for while the vessel is empty, the ray HI will naturally proceed in a straight line; but in proportion as it becomes immered in water, it will be necessarily refracted into the several directions NE, OF, PG, and consequently the several pieces must become visible.

II. Optical Augmentation.

Take a large drinking glass of a conical figure, that is small at bottom and wide at top; in which put a shilling, and fill the glass about half full with water; then place a plate on the top of it, and turn it quickly over, that the water may not get out. You will then see on the plate, a piece of the size of a half crown; and somewhat higher up, another piece of the size of a shilling.

This phenomenon arises from seeing the piece through the conical surface of the water at the base of the glass, and through the flat surface at the top of the water at the same time: for the conical surface dilates the rays, and makes the piece appear larger; but by the flat surface the rays are only refracted, by which the piece is seen higher up in the glass, but still of its natural size. That this is the cause will be further evident by filling the glass with water; for as the shilling cannot be then seen from the top, the large piece only will be visible.

III. Optical Subtraction.

Against the wainscot of a room fix three small pieces of paper, as A, B, C, at the height of your eye; and placing yourself directly before them, shut your right eye and look at them with the left; when you will see only two of those papers, suppose A and B; but altering the position of your eye, you will then see the third and one of the first, suppose A; and by altering your position a second time, you will see B and C; but never all three of them together.

The cause of this phenomenon is, that one of the three pencils of rays that come from these objects, falls constantly on the optic nerve at D; whereas to produce distinct vision, it is necessary that the rays of light fall on some part of the retina E, F, G, H. We see by this experiment, one of the uses of having two eyes; for he that has only one, can never see three objects placed in this position, nor all the parts of one object of the same extent, without altering the situation of his eye.

IV. Alternate Illusion.

With a convex lens of about an inch focus, look at
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at attentively a silver seal, on which a cipher is engraved. It will at first appear cut in, as to the naked eye; but if you continue to observe it some time, without changing your situation, it will seem to be in relief, and the lights and shades will appear the same as they did before. If you regard it with the same attention still longer, it will again appear to be engraved: and so on alternately.

If you look off the seal for a few moments, when you view it again, instead of seeing it, as at first, engraved, it will appear in relief. If, while you are turned toward the light, you suddenly incline the seal, while you continue to regard it, those parts that seemed to be engraved will immediately appear in relief: and if, when you are regarding these seeming prominent parts, you turn yourself so that the light may fall on the right hand, you will see the shadows on the same side from whence the light comes, which will appear not a little extraordinary. In like manner the shadows will appear on the left, if the light fall on that side. If, instead of a seal, you look at a piece of money, these alterations will not be visible, in whatever situation you place yourself.

It has been suspected that this illusion arises from the situation of the light; and in fact, ‘I have observed (says M. Guyot, from whom this article is taken), that when I have viewed it with a candle on the right, it has appeared engraved: but by changing the light to the left side, it has immediately appeared in relief.’ It still, however, remains to be explained, why we see it alternately hollow and prominent, without changing either the situation or the light. Perhaps it is in the light itself that we must look for the cause of this phenomenon; and this seems the more probable, as all these appearances are not discernible by all persons.

Mr William Jones of Holborn, has remarked to us, that this illusion is still more extraordinary and permanent, when you look at a cavity in a seal or other object through the three eye-glasses of a common four glafs refracting telescope: all cavities viewed through these glases appear constantly relieved, in almost all situations of the light you see them with.

V. The Dioptrical Paradox.

A new and curious optical, or what may be called properly a dioptrical, deception, has been made by Mr W. Jones. Its effect is, that a print, or an ornamented drawing, with any object, such as an ace of diamonds, &c. in the centre F, will be seen as the ace of clubs when it is placed in the machine ABDC, and viewed through a single glass only contained in the tube E. The contrivance of this machine is truly simple. The glass in the tube F, which brings about this surprising change, is somewhat on the principle of the common multiplying glases, as represented at G, which by the number of its inclined surfaces, and from the refractive power of the rays proceeding from the objects placed before it, shows it in a multiplied state or quantity. Its only difference is, that the sides of this glass are flat, and diverge upwards from the base to a point in the axis of the glass like a cone: the number of the sides is fix; and each side, from its angular position to the eye, has the property of refracting from the border of the print F such a portion of it (designedly there placed), as will make a part in the composition of the figure to be represented: for the hexagonal and conical figure of this glas prevents any light of the ace of diamonds in the centre being seen; consequently the ace of clubs being previously and mechanically drawn in the circle of refraction in six different parts of the border, at 1, 2, 3, 4, 5, 6, and artfully disposed in the ornamental border by blending them with H, the glasses in the tube E will change with the appearance of the ace of diamonds F into the ace of clubs G. In the same manner may other prints undergo similar changes, according to the will of an ingenious draughtsman who may design them. The figure of the glas is clearly shown at H.

VI. The Camera Obscura, or Dark Chamber.

Make a circular hole in the shutter of a window, from whence there is a prospect of the fields, or any other object not too near; and in this hole place a convex glas, either double or single, whose focus is at the distance of five or six feet (a). Take care that no light enter the room out by this glas: at a distance from it, equal to that of its focus, place a pasteboard, covered with the whitest paper; which should have a black border, to prevent any of the side rays from disturbing the picture. Let it be two feet and a half long, and 18 or 20 inches high; bend the length of it inwards, to the form of part of a circle, whose diameter is equal to double the focal distance of the glass. Then fix it on a frame of the same figure, and put it on a moveable foot, that it may be easily fixed at that exact distance from the glases where the objects paint themselves to the greatest perfection. When its thus placed, all the objects that are in the front of the window will be painted on the paper, in an inverted position (e), with the greatest regularity and in the most natural colours.

(a) The distance should not be less than three feet; for if it be, the images will be too small, and there will not be sufficient room for the spectators to stand conveniently. On the other hand, the focus should never be more than 15 or 20 feet, for then the images will be obscure, and the colouring faint. The best distance is from 6 to 12 feet.

(e) This inverted position of the images may be deemed an imperfection, but it is easily remedied: for if you stand above the board on which they are received, and look down on it, they will appear in their natural position: or if you stand before it, and, placing a common mirror against your breast in an oblique direction, look down in it, you will there see the images erect, and they will receive an additional lustre from the reflection of the glases; or place two lenfes, in a tube that draws out; or, lastly, if you place a large concave mirror at a proper distance before the picture, it will appear before the mirror, in the air, and in an erect position.
DIOPTRICS.

If you place a moveable mirror without the window; by turning it more or less, you will have on the paper all the objects that are on each side of the window (c).

If instead of placing the mirror without the window you place it in the room, and above the hole (which must then be made near the top of the shutter), you may receive the representation on a paper placed horizontally on a table; and draw, at your leisure, all the objects that are there painted.

Nothing can be more pleasing than this experiment, especially when the objects are strongly enlightened by the sun: and not only land-prompts, but a sea-port, when the water is somewhat agitated, or at the setting of the fun, presents a very delightful appearance.

This representation affords the most perfect model for painters, as well for the tone of colours, as that degradation of shades, occasioned by the interposition of the air, which has been so justly expressed by some modern painters.

It is necessary that the paper have a circular form; for otherwise, when the centre of it was in the focus of the glafs, the two sides would be beyond it, and consequently the images would be confused. If the frame were contrived of a spheriwal figure, and the glafs were in its centre, the representation would be still more accurate. If the object without be at the distance of twice the focal length of the glafs, the image in the room will be of the same magnitude with the object.

The lights, shades, and colours, in the camera obscura, appear not only just, but, by the images being reduced to a smaller compass, much stronger than in nature. Add to this, that these pictures exceed all others, by representing the motion of the several objects: thus we see the animals walk, run, or fly; the clouds float in the air; the leaves quiver; the waves roll, &c.; and all in strict conformity to the laws of nature. The best situation for a dark chamber is directly north, and the best time of the day is noon.

To show the spots on the Sun's Disk, by its Image in the Camera Obscura.

Put the object-glafs of a 10 or 12 feet telescope into the sphericall ball, and turn it about till it be directly opposite to the fun (p). Then place the paperboard, mentioned in the last experiment, in the focus of the lens; and you will see a clear bright image of the fun, of about an inch diameter, in which the spots on the fun's surface will be exactly described.

As this image is too bright to be seen with pleasure by the naked eye, you may view it through a lens whose focus is at six or eight inches distance; which at the same time that it prevents the light from being offensive, will, by magnifying both the image and the spots, make them appear to greater advantage.

To magnify small Objects by means of the Sun's Rays let into a Dark Chamber.

Let the rays of light that pass through the lens in the shutter be thrown on a large concave mirror, properly fixed in a frame. Then take a slip or thin plate of glafs; and sticking any small object on it, hold it in the incident rays, at a little more than the focal distance from the mirror; and you will see, on the opposite wall, amidst the reflected rays, the image of that object, very large, and extremely clear and bright.

This experiment never fails to give the spectator the highest satisfaction.

The portable camera obscura,

The great pleasure produced by the camera obscura in the common form, has excited several to render it more universally useful by making it portable; easily fixed on any spot, and adapted to every prospect. We shall not here examine the merits of the various forms that have been invented; but content ourselves with describing two of late improved constructions, as made and sold by the opticians of the present time, and that appear in their construction the most convenient and advantageous of any yet contrived.

The portable camera obscura, with a drawer to draw out in the front, is represented in fig. 7. Fig. 7.

The images of the objects before the instrument are reflected upon a glafs ground rough on its upper side, and that is placed at top of the hinder part of the box, under the moveable cover represented in the figure. The images presented therewith will afford a most beautiful and perfect piece of perspective or landscape of whatever is before the camera, and more particularly so if the sun shines upon the objects. The outlines of them may easily be traced on the glafs by a black-lead pencil. There is sometimes a scale of proportions placed in the upper surface of the drawer, by which any particular building or other object may be drawn in a given proportion or magnitude, and according to the figures inferred on the scale, which are adapted to the focus or foci of the lenses made use of in the camera. The glasses that are made use of in this camera are only three, and are represented in fig. 8. The convex glafs A is placed in the front of the drawer of the camera, and is of a focus agreeable to the length of the box. The mirror CE reclines in the box in an angle of 45 degrees from a perpendicular situation. The rays flowing from the object F through the convex glafs A to the plane mirror CE, will be reflected from it, and meet in points on the glafs placed horizontally.

(c) There is another method of making the dark chamber; which is by a sphericall ball, that is, a ball of wood, through which a hole is made, in which hole a lens is fixed: this ball is placed in a wooden frame, in which it turns freely round. The frame is fixed to the hole in the shutter; and the ball, by turning about, answers, in great part, the use of the mirror on the outside of the window. If the hole in the window be not bigger than a pea, the objects will be represented without any lens, though by no means so distinctly, or with such vivid colours.

(b) When the fun is directly opposite to the hole, the lens will itself be sufficient: or by means of the mirror on the outside of the window, as in Experiment VI. the lens will answer the purpose at any time.
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I. **D I O P T R I C S.**

zontally in the direction CD, and will form thereof the aforementioned images. If on this glass an oiled piper or any other transparent substance be placed, the images will be clearly represented, and sufficiently so to delineate them by a black lead pencil or crayon. Instead of the glass CD, or sometimes underneat it, is often placed a double convex lens of a focus somewhat shorter than the length of the box; this alteration considerably brightens the appearance of the images, and renders them as vivid as the objects themselves, though not quite so accurate in their contours or outlines as by the preceding method.

Another kind of portable camera obscura, is where the images are formed upon white paper, and the several parts of the camera fold up out of a box shaped like a book or chest. This way of the images being formed on paper is a much preferable one to the preceding method, and admits of their being traced on the paper with the utmost readiness. This instrument, as open out of its case and ready for use, is represented in fig. 9. The front and sides fold up to the height of about two feet from the case EFG, by means of hinges placed at F, H, &c. The head ABCD, about five or six inches square and high, containing the mirror L and the convex lens beneath it, fits on at CD, and the inner square tube of it is moved up and down by rack-work and a pinion NM. This motion serves to adjust the convex lens d to its proper focal distance from the white paper placed within side at the bottom of the box EFG, so that the images may be formed with the greatest possible distinctness. In tracing these images the face is applied close to the hole in the front at K, and the hand in the sleeve in the front at the bottom of FG. When the sides and front are unhooked and folded down, they all lie close in the box EFG, and the lid O folds down as a top on them close, and the box remains then the size of a common folio book, and is covered with calf leather and lettered on the back in perfect imitation of one.

By the diagonal position of a plane mirror the curious opera-glasses is constructed, by which any person may be viewed in a theatre or public company, and yet know nothing of it. It consists only in placing a concave glass near the plane mirror, in the end of a short round tube, and a convex glass in a hole in the side of the tube. Then holding the end of the tube with the glasses to the eye, all objects next to the hole in the side will be reflected so as to appear in a direct line forward, or in a position at right angles to the person's situation who is looked at. Plane glasses instead of a concave and convex may be used; but in the case there will be no magnitude of the object, but it will appear brighter. It is called by opticians the diagonal opera-glasses.

**X. The Magic Lantern.**

This very remarkable machine, which is now known all over the world, caused great astonishment at its origin. It is still beheld with pleasing admiration; and the spectator very frequently contents himself with wondering at its effects, without endeavouring to investigate their cause. The invention of this ingenious illusion is attributed to the celebrated P. Kercher, who has published on various sciences, works equally learned, curious, and entertaining. Its design is to represent at large, on a cloth or board, placed in the dark, the images of small objects, painted with transparent colours on plates of glass.

The construction is as follows. Let ABCD be the side of a tin box, eight inches high, eight inches long, and ten broad (or any other similar dimensions), the top of which must have a funnel, with a cover, as represented in fig. 11; which at the same time it gives a passage to the smoke, prevents the light from coming out of the box. In the middle of the bottom of the box must be placed below a tin lamp E, which is to be moveable. It should have three or four lights, which must be at the height of the centre of the glasses in the tubes N and O. In the largest of these tubes must be placed a glass semiglobular N, about four inches diameter; and in the smaller one a double convex lens o, about 2½ inches diameter, and six inches focus, the length of the tubes holding them about 4 inches each: the inner tube containing the small lens o must be a sliding one, in order to adjust it at a proper distance from the pointed sliders, so that the objects thereon may be distinctly represented on the cloth or white wall. A slit or opening between the glasses N and O, or even a slit in the box must be made large enough to admit the sliders to be passed through, (as in fig. 11.) The clearness of the light, and the objects upon the cloth, will depend much upon the light of the lamp: it will therefore be proved best to place, instead of the common lamp E, a kind of the new or Argent's Patent Lamp, which will be found considerably to improve the effect of the lantern by its superior strength of light.

From the construction of this lantern it is evident, that when the glasses sliders, with the painted figures, are placed in the groove or slit in the lantern for that purpose, and the room darkened, a quantity of light from the lamp E will be collected by the lens N, and refracted upon the cloth placed opposite; and that by moving the sliding tube containing the small lens o gradually in or out as occasion may require, this lens will form images of the figures on the sliders in their distinct colours and proportions with the appearance of life itself, and of any size from six inches to 7 feet according to the distance of the lantern from the cloth. The lantern, with one of the sliders ready for use, is clearly represented in fig. 11. By the aid of the new patent lamp aforementioned, considerable useful improvements are made to this lantern. Mr. Jones of Holborn has contrived an apparatus to be applied to it, that converts it into a microscope by night; and it shows all the variety of transparent and many of the opaque objects magnified upon a cloth or screen opposite, similar to the figures abovementioned, but not in so large a degree; about one or two feet diameter is the utmost that can at present be obtained.

**Method of Painting the Glasses for the Lantern.** Draw on the paper the subject you desire to paint, and fix it at each end to the glasses. Provide a varnish with which you have mixed some black paint and with a fine pencil draw on the other side of the glasses, with very light touches, the design drawn on the paper. If you are desirous of making the painting as perfect as possible, you should draw some of the outlines in their proper
proper colours, provided they are the strongest tints of these colours that are used. When the outlines are dry, you colour the figures with their proper tints or degradations. Transparent colours are most proper for this purpose, such as carmine, lake, Prussian blue, verdigris, &c. and these must be tempered with a strong white varnish, to prevent their peeling off. You are then to shade them with black mixed with the same varnish or with bitre, as you find convenient. You may also leave strong lights in some parts, without any colours, in order to produce a more striking effect. Observe in particular, not to use more than four or five colours, such as blue, red, green, and yellow. You should employ, however, a great variety of tints, to give your painting a more natural air; without which they will represent vulgar objects, which are by no means the more pleasing because they are gaudy.

When the lamp in this lantern is lighted, and, by drawing out the tube to a proper length, the figures painted on the glass appear bright and well defined, the speculator cannot fail of being highly entertained by the succession of natural or grotesque figures that are painted on the glass. This piece of optics may be rendered much more amusing, and at the same time more entertaining, or by drawing the subject on two glasses, and passing them at the same time through the groove, as will be seen in the next experiment.

XI. To represent a Tempest by the Magic Lantern.

Provide two plates of glass, whose frames are so thin that they may both pass freely through the slit or groove of the common magic lantern at the same time.

On one of these glasses you are to paint the appearance of the sea, from the lightest agitation to the most violent commotion. Representing from A to B a calm; from B to C a small agitation, with some clouds; and so on to F and G, which should exhibit a furious storm. Observe, that these representations are not to be distinct, but run into each other, that they may form a natural gradation: remember also, that great part of the effect depends on the perfection of the painting, and the picturesque appearance of the design.

On the other glass you are to paint vessels of different forms and dimensions, and in different directions, together with the appearance of clouds in the tempestuous parts.

You are then to pass the glasses slowly through the groove; and when you come to that part where the storm begins, you are to move the glasses gently up and down, which will give it the appearance of a sea that begins to be agitated; and so increase the motion till you come to the height of the storm. At the same time you are to introduce the other glass with the ships, and moving that in like manner, you will have a natural representation of the sea, and of ships in a calm and in a storm. As you draw the glasses slowly back the tempest will seem to subside, the sky grow clear, and the ships glide gently over the waves.—By means of two glasses disposed in this manner you may likewise represent a battle, or sea-fight, and numberless other subjects, that are never known to act according to his own taste. They may also be made to represent some remarkable or ludicrous action between different persons, and many other amusements that a lively imagination will easily suggest.

XII. The Nebulous Magic Lantern.

The light of the magic lantern, and the colour of images, may not only be painted on cloth, but also reflected by a cloud of smoke.

Provide a box of wood or pasteboard (fig. 14.) of about four feet high, and of seven or eight inches square at bottom, but diminishing as it ascends, so that its aperture at top is but six inches long, and half an inch wide. At the bottom of this box there must be a door (fig. 14.) that shuts quite close, by which you are to place in the box a chafing-dish with hot coals, on which is to be thrown incense, whose smoke goes out in a cloud at the top of the box. It is on this cloud that you are to throw the light that comes out of the lantern, and which you bring into a smaller compass by drawing out the moveable tube. The common figures will here serve. It is remarkable in this representation, that the motion of the smoke does not at all change the figures; which appear so confounding, that the speculator thinks he can grasp them with his hand.

Note, In this experiment some of the rays passing through the smoke, the representation will be much less vivid than on the cloth; and if care be not taken to reduce the light to its smallest focus, it will be still more imperfect.

XIII. To produce the Appearance of a Phantom upon a Pedestal placed on the middle of a Table.

Enclose a common small magic lantern in a box ABCD, that is large enough to contain also an inclined mirror M; which must be moveable, that it may reflect the cone of light thrown on it by the lantern, in such a manner that it may pass out at the aperture made in the top of the box. There should be a flap with hinges to cover the opening, that the inside of the box may not be seen when the experiment is making. This aperture should likewise be oval, and of a size adapted to the cone of light that is to pass through it. There must be holes made in that part of the box which is over the lantern, to let out the smoke; and over that part must be placed a chafing-dish of an oblong figure, and large enough to hold several lighted coals. This chafing-dish may be inclosed in a painted tin box of about a foot high, and with an aperture at top something like fig. 14. It should stand on four short feet to give room for the smoke of the lamp to pass out. There must also be a glass that will ascend and descend at pleasure in a vertical groove ab. To this glass let there be fixed a cord, that, going over a pulley...
DIOPTRICS.

Plate CLXII.

Fig. 16. In the decorations, the clouds and the palaces of the gods should descend; caves and infernal palaces should ascend; earthly palaces, gardens, &c. enter at the sides.

XIV. The Magic Theatre.

By making some few additions to the magic lantern with the square tube, used in Experiment X. various scenes, characters, and decorations of a theatre may be represented in a lively manner. This experiment perhaps requires a little more care than common, that the images may be represented in a lively manner. In this experiment the magic lantern being thus adjusted, nothing more is necessary than to provide glasses, painted with such subjects as you would represent, according to the grooves they are to enter. The lamp is then to be lighted; and placing a glass in one of the grooves, you draw out the movable tubes till the object painted itself on a cloth to the most advantage: by which you determine the distance of the lantern and the size of the image. You then make a hole in the partition of that size, and fix it in a plate of clear glass, over which you paste a very thin paper, which must be varnished, that it may be as transparent as possible.

On this paper are to be exhibited the images of all those objects, that, by passing successively through the grooves, are to represent a theatrical entertainment. The exhibition will be very agreeable; because the magic lantern being concealed behind the partition, the cause of the illusion cannot by any means be discovered.

In order to show more clearly in what manner a subject of this sort should be painted, and the glasses disposed, we will here make choice of the siege of Troy for a theatrical subject; in which will be found all the incidents necessary to the exhibition of any other subject whatever. In the first act, the theatre may represent, on one side, the ramparts of Troy; toward the back-part, the Grecian camp; and at a further distance the sea, and the isle of Tenedos. We will suppose the time to be that when the Greeks feigned to raise the siege; and embarked, leaving behind them the wooden horse, in which were contained the Grecian soldiers.

On a glass, therefore, of the same width with the aperture made in the side AC of the box, you are to paint a deep blue curtain, lightly charged with ornaments quite transparent. This glass is to be placed in the first vertical groove; so that by letting it gently down, its image may appear to rise in the same manner as the curtain of a theatre. All the glasses that are to ascend or descend must be bordered with thin pieces of wood, and so exactly fill the grooves, that they may not slide down of themselves. You must have several glasses of proper size to pass through the horizontal grooves, and of different lengths according to the extent of the subject. You may paint, on the first, the walls of Troy. On the second, the Grecian camp. On the third, the sea, the isle of Tenedos, and a clear sky. On the fourth, the Grecian troops...
D I O P T R I C S.

Plate CLXII.

troops by detached figures. On the fifth, other troops, disposed in battalions, and placed at a distance. On the sixth, divers vessels, which as the glafs advances in the groove diminish in size. On the seventh, the wooden horse and Sinon. On the eighth, Trojan men and women.

These glases being properly painted, you place in the horizontal grooves the first, second, third, and fourth. Then draw up the curtain, by letting down the glas on which it is painted, and draw away gently the fourth glas, and after that the second; then advance very gently the fifth, that represents the embarkment, and pass it quite through. Next pass the opposite way, the sixth, which represents the Grecian fleet. The objects painted on the fourth, fifth, and sixth, quite disappearing, you are to advance the seventh, on which is painted the wooden horse; and at the same time the eighth, where the Trojans will appear to draw the horse into the city. The curtain is then to be let down, that you may withdraw the scenes of the first act, and place in the grooves those that are to compose the second.—In the second act may be represented the interior part of the city of Troy: on one side may be seen the wooden horse, and in the back part the temple of Pallas. The glases for this act may be painted in the following manner. On the first may be palaces and houses, representing the inside of a city. On the second, the temple of Pallas in the centre, with a clear night and the moon. In the first may be seen the wooden horse, that the Trojans have placed near the temple of Pallas. On the third, a troop of Greeks, with Sinon at their head, who are going to open the gates of the city to the Grecians. On the fourth, different troops of armed Greeks; painted on a long glass, to afford variety. On the fifth, several troops of Trojans. On the sixth, various appearances of fire and smoke, so disposed, that this glas being drawn up above the others, the objects painted on the first glas may appear in a conflagration.

Before you draw up the curtain, you should place the first and second glases. You then pass the whole third glas slowly; a little after, the fourth, on which are painted the different bodies of armed Greeks; and at the same time, from the opposite side, the fifth glas, that represents the Trojan troops; observing to move them slowly both in advancing and retreating, to imitate a combat (a). Then draw up, by degrees, the sixth, on which are painted the fire, flame, and smoke, so that the palaces and houses painted on the first glas may appear to take fire gradually, and at last present a general conflagration. After having represented these incidents with the greatest attention, you let fall the curtain to prepare for the third act. In this may be represented the inside of Priam’s palace; where is seen an altar, round which several Trojan princes appear, who have fled thither for safety. On the first glas may be painted the palace. On the second, a view of the back part of the palace, with the altar. On the third, Priam with several Trojan men and women. On the fourth, Pyrrhus and a troop of Greeks. On the fifth, the same actors, with the palace in flames. On the sixth, a conflagration.—The two first glases which are to be drawn up, should be placed before you, raise the curtain. Then pass the third; next advance the fourth; which being drawn up, discovers on the fifth the palace in flames; then drawing up the sixth, let down the first, that the palace may appear entirely destroyed by the conflagration.

The fourth act may represent the environs of Troy, with a distant prospect of the sea. The first and third glases of the first act may be here used; to which may be added a third, representing Aeneas bearing his father Anchises, followed by his son Iulus and some Trojans. With this glas may be represented the flight of the Trojans and the embarkment of Aeneas; with another glas on which are painted certain vehicles.—To this act the following scenes may be added: cave of Aolus; the back part of the cave; Aolus; the winds; Juno in her chariot.

The fifth act should represent the open sea, with the fleet of Aeneas sailing for Italy. On the first glas must be painted the sea, as in the eleventh Experiment, or else the waves should be imitated by another glas under the first. On the second, the Trojan fleet. On the third, Neptune in his car. On the fourth, the palace of Jupiter. On the fifth, the inside of the palace, the gods assembled in council, with Venus obtaining leave of Jupiter for Aeneas to land in Italy.—After having placed the first glas, that represents a calm sea, the curtain is raised, and the second scene is advanced, which contains the Trojan fleet. The first is then brought forward, to represent a violent tempeft; then raising the third glas, Neptune appears, who commands the waves to be still, which is done by making the tempeft subside by degrees. The fleet then advances, and passes over the whole theatre; presently after the fourth and fifth scenes descend, that represent Olympus, and finish the exhibition.

Note, We must here repeat, that if you would represent a subject of this sort to advantage, it is quite necessary that the glases be well painted; and those that are to be in front should be in stronger and more opaque colours, that the images of those behind may not appear mixed with them, which will be the case if they be all equally transparent. The glases should also be of different lengths; some being placed before the others are drawn away, their extremities may not be perceived.

The larger the subject are represented, the better effect they will have: the front of the theatre should appear to be about three feet wide; and if some parts of the figures were moveable, it would still add to the variety of the entertainment.

(a) He that moves the glases, seeing the effect they produce, is the better able to render the representation as natural as possible.

DIOSCOREA,
Dioscorea dioscorides

Dioscorea, in botany, a genus of the hexandria order, belonging to the dioecious class of plants; and in the natural method ranking under the 11th order, Saniculoideae. The male calyx is 5-lobed; there is no corolla; the female calyx is 4-lobed; no corolla; three styles; the capsule trilocular and compressed; and there are two membranaceous seeds. There are eight species, of which the only remarkable one is the babi, or yam. This hath triangular winged stalks, which trail upon the ground, and extend a great way; thefe frequently put out roots from their joints as they lie upon the ground, by which the plants are multiplied. The roots are eaten by the inhabitants of both the Indies; and are particularly serviceable in the West India islands, where they make the greatest part of the negroes food. The plant is supposed to have been brought from the East to the West Indies; for it has never been observed to grow wild in any part of America; but in the island of Ceylon, and on the coast of Malabar, it grows in the woods, and there are in those places a great variety of sorts. It is propagated by cutting the root in pieces, observing to preserve an eye in each, as is practiced in planting potatoes. The plant will produce three or four large roots. The flesh of these roots is pretty thick, rough, unequal, covered with many stringy fibres or filaments, and of a violet colour approaching to black. The inside is white, and of the consistence of red beets. It resembles the potato in its mealinnes, but is of a clover texture. When raw the yams are viscos, and clumny: when roasted or boiled, they afford very nourishing food; and are often preferred to bread by the inhabitants of the West Indies, on account of their lightness and facility of digestion. When first dug out of the ground, the roots are placed in the sun to dry: after which, they are either put into sand, dry garrets, or cellars; where, if kept from moisture, they may be preserved whole years, without being spoilt or diminished in their goodness. The root commonly weighs two or three pounds; tho' some yams have been found upwards of 20 pounds weight.

Dioscorides, a physician of Cilicia, who lived, as some suppose, in the age of Nero. He was originally a foddier; but afterwards he applied himself to study, and wrote a book upon medicinal herbs.

Dioscurea, from Δίος Ίππις, and ιππαρθένον, in antiquity, a festival in honour of the Δίος Ίππις, or Caelus and Pallas, who were reputed to be sons of Jupiter. It was observed by the Cyprians, but more especially by the Spartans, whose country was honoured by the birth of these heroes. The solemnity was full of mirth, being a time wherein they thronged plentifully of the gifts of Bacchus, and diverted themselves with sports, of which wrestling matches always made a part.

Diospoma, African spiræa: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking with those of which the order is doubtful. The corolla is pentapetalous, the nectarium crown-shaped above the germin; there are five capsules coalesced; the seeds hooded. There are nine species; of which the most remarkable are the hirsuta, with narrow hairy leaves; and the opulenta, with leaves placed in the form of a cross. The first is a very handsome shrub, growing to the height of five or six feet; the stalks are of a fine coral colour; the leaves come out alternately on every side of the branches, and are narrow-pointed and hairy; the flowers are produced in small clusters at the ends of the shoots, and are of a white colour. They are succeeded by starry seed-vesicles having five corners; and in each of which corners is a cell, containing a smooth, shining, oblong, black seed: these seed-vesicles abound with a resin which emits a grateful scent, as doth also the whole plant. The second species rises to the height of three or four feet; the branches are slender, and produced from the stem very irregularly; the leaves are placed cross-ways; the flowers are produced at the ends of the branches, between the leaves: the plants continue a long time in flower, and make a fine appearance when they are intermixed with other exotics in the open air. Both species are propagated by cuttings; which may be planted during any of the summer-months in pots, and plunged into a moderate hot-bed, where they should be shaded from the sun, and frequently watered. In about two months they will have taken root; when each should be transplanted into a small pot where they are to remain; but during winter, like most other exotic plants, they must be preferred in a green-house.

Diospolis (anc. geog.), a city of the Delta, or Lower Egypt; to the south of the Bosphorus branch, before it divides into two. Another of Bithynia, in the territory of Heraclea. A third, called Magna, noting Thebes of the Higher Egypt. A fourth, Diospolis, the metropolis of the Nomos Diospolis of the Higher Egypt. A fifth, Diospolis of Samaria, the same with Lydda. A sixth Diospolis, the ancient name of Laodicea of Phrygia on the Lycus.

Diospolites nomos (Ptolemy) a division of Thelais or the Higher Egypt, to distinguish it from another of the Lower Egypt, or the Delta, to the south of the Nomos Thinite in, on the west side of the Nile.

Diospyros, the Indian date-plum: A genus of the dioecious order, belonging to the polygamia class of plants; and in the natural method ranking under the 18th order, Bicornea. The calyx is hermaphroditic and quadrifid; the corolla uculated and quadrifid; there are eight stamens; the style quadrifid; the berry octo-permous: the male calyx, corolla and filaments, as in the former. There are two species. 1. The lotus, which is supposed to be a native of Africa, from whence it was transplanted into several parts of Italy, and alfo into the south of France. The fruit of this tree is supposed to be the lotus with which Ulysses and his companions were enchanted, and which made those who eat of it forget their country and relations: (See also Ramnus.) In the warm parts of Europe this tree grows to the height of 30 feet. In the botanic garden at Padua, there is one very old tree which has been described by some of the former botanists under the title of guaiacum pataviniun. This tree produces plenty of fruit every year; from the seeds of which many plants have been raised. 2. The Virginia, pinamin, perlimon, or pitchum plum, is a native of America, but particularly of Virginia and Carolina. The seeds of this tree have been frequently exported to Britain, and the trees are common in many nurseries about London. It attains to the height of 12 or 14 feet; but generally divides into many irregular trunks.
Dipthong, in grammar, a double vowel, or the mixture of two vowels pronounced together, so as to make one syllable.

The Latins pronounced the two vowels in their diphthongs ae, or a, oe or oo, much as we do; only that the one was heard much weaker than the other, tho' the division was made with all the delicacy imaginable. Diphthongs, with regard to the eyes, are distinguished from those with regard to the ears: In the former, either the particular sound of each vowel is heard in the pronunciation; or the sound of one of them is drowned; or, lastly, a new sound, different from either, results from both: the first of these only are real diphthongs, as being such both to the eye and ear. Diphthongs with regard to the ear are either formed of two vowels meeting in the same syllable, or of three vowels in the same syllable, which only afford discernible combinations.

Diphthongs, with regard to the eye only, are æ, eu, ou, ee, oo, ou. Improper English diphthongs, with regard to the eye only, are ou, eu, eo, ee, ou, eu, ee, ou, ou, æu, ou, eu.

Diploe, in anatomy, the soft medullary, or medullary substance, which lies between the two laminae of the bones of the cranium. See Anatomy, n. 11.

Diploma, See Diplomatics.

In a peculiar sense, it is used for an instrument or licence given by colleges, societies, &c. to a clergyman to exercise the ministerial function, or to a physician to practise the profession, &c. after passing examination, or admitting him to a degree. Diplomatics, the science of diplomas, or of ancient literary monuments, public documents, &c. It does not, however, nor can it, absolutely extend its researches to antiquity; but is chiefly confined to the middle age, and the first centuries of modern times. For though the ancients were accustomed to reduce their contracts and treaties into writing; yet they graved them on tables, or covered them over with wax, or braes, copper, bone, or wood, &c. And all that in the first ages were not traced on braes or marble, has perished by the length of time, and the number of destructive events.

1. The word diploma signifies, properly, a letter or epistle, that is folded in the middle, and that is not open. But in more modern times, the title has been given to all ancient epistles, letters, literary monuments, and public documents, and to all those pieces of writing which the ancients called Syngrapha, Chirographa, Codicilli, &c. In the middle age, and in the diplomas themselves, these writings are called Lettra, Praecepta, Piction, Charta Indica, Sagilla, and Bullae; asalso Pancharta, Panbucharte, Traidoria, Discriptiones, &c. The originals of these pieces are named Examplaria, or Autographa, Charta authentic; Originalia, &c. and the copies, Apographa, Copia, Particulae, and so forth. The collections that have been made of them, are called Chartaria and Chartula. The place where these papers and documents were kept, the ancients named Scribitum, Tabularium or Erarium, words that were derived from the tables of braes, and, according to the Greek idiom, Archivum or Archbium.

2. In order to understand the nature of these ancient papers, diplomas, and manuscripts, and to distinguish the authentic from the counterfeit, it is necessary to know that the paper of the ancients came from Egypt, and was formed of thin leaves or membranes, taken from the branches of a tree named Papyrum, or Biblia Epygptiaca, and which were pasted one over the other with the slime of the Nile, and were prefixed and polished with a pumice-stone. This paper was very scarce; and it was of various qualities, forms, and prices, which they distinguished by the names of charta litteration, larv, augista, amphitheatrica, fatica, pancia, emporistica, &c. They cut this paper into square leaves, which they pasted one to the other, in order to make rolls of papers; from whence an entire book was called volumen, from volvendo; and the leaves of which it consisted, pagina. Sometimes, also, they pasted the leaves all together, and formed of one of their extremities, as is now practiced in binding; by this method they formed the back of a book, and the learned called codices. They rolled the volume round a stick which they named umbilicus; and the two ends that came out beyond the paper, corona. The title, wrote on parchment, in purple characters, was joined to the last leaf, and served it as a cover. They made use of all sorts of rings or ribbands, and even sometimes of locks, to close the book; and sometimes also it was put into a case. But there is not now to be found, in any library or cabinet whatever, any one of these volumes. We have been assur'd, however, by a traveller, that he had seen several of them in the ruins of Hierusalem; but fo damaged, the paper so stiff and brittle, by the length of time, that it was impossible to unroll them, and consequently to make any use of them; for on the first touch they fell into fragments.

3. We are ignorant of the precise time when our modern paper was invented: and when they began to make use of pens in writing, instead of the stalks of reeds. The ink that the ancients used, was not made of vitriol and gall, like the modern, but of soot. Sometimes also they wrote with red ink made of vermilion; or in letters of gold, on purple or violet parchment. It is not difficult for those who apply themselves to this study, to distinguish the parchment of the ancients from that of the moderns, as well as their ink and various exterior characters: but that which best distinguishes the original from the counterfeit is the writing or character itself; which is so distinctly different from one century to another, that we may tell with certainty, within about 40 or 50 years, when any diploma was written. There are two works which furnish the clearest lights on this matter, and which may serve as true guides in the judgments we may have occasion to make on what are called ancient diplomas. The one is the celebrated treatise on the Diplomatic, by F. Mabillon; and the other, the first volume of the Chronicon.
We there find specimens of all the characters, the flourishes, and different methods of writing, of every age. For these matters, therefore, we must refer our readers to those authors, and shall here only add, that,

4. All the diplomas are wrote in Latin, and consequently the letters and characters have a resemblance to each other; but there are some strokes of the pen which distinguishes not only the ages, but also the different nations; as the writings of the Lombards, French, Saxon, &c. The letters in the diplomas are also usually longer, and not so strong as those of manuscripts.

There has been also introduced a kind of court-hand, of a very disproportionate length, and the letters of which are called Exiles litterae, cripe, ac proctiores. The first line of the diploma, the signature of the sovereign, that of the chancellor, notary, &c. are usually wrote in this character.

5. The signature of a diploma consists either of the sign of the cross, or of a monogram or cipher, composed of the letters of the names of those who subscribed it. The initial letters of the name, and sometimes also the titles, were placed about this cross. By degrees the custom changed, and they invented other marks; as, for example, the sign of Charlemagne was thus:

\[ \text{R} \]
\[ \text{X} \]
\[ \text{l} \]

They sometimes added also the dates and epoch of the signature, the feasts of the church, the days of the calendar, and other like matters. The successive corruption of the Latin language, the style and orthography of each age, as well as their different titles and forms; the abbreviations, accentuation, and punctuation, and the various methods of writing the diphthongs; all these matters united, formed so many characters and marks by which the authenticity of a diploma is to be known.

6. The seal annexed to a diploma was annually of white wax, and artfully imprinted on the parchment itself. It was afterward pendent from the paper, and inclosed in a box or casket, which they called bulla. There are some also that are stamped on metal, and even on pure gold. When a diploma bears all the characters that are requisite to the time and place where it is supposed to be written, its authenticity is not to be doubted; but, at the same time, we cannot examine them too scrupulously, feeling that the monks and priests of former ages have been very adroit in making of counterfeit; and the more, as they enjoyed the confidence of princes and statesmen, and were even sometimes in possession of their rings or seals.

7. With regard to manuscripts that were wrote before the invention of printing, it is necessary (1.) to know their nature, their essential qualities, and matter; (2.) to be able to read them freely, and without error; (3.) to judge of their antiquity by those characters which we have just mentioned with regard to the diplomas; and, (4.) to render them of use in the sciences. As there are scarce any of the ancient codes now remaining, (see par. 2.), wrote on the Egyptian paper, or on wood, ivory, &c. we have only to consider those that are written on parchment or vellum (membranos).

and such as are wrote on our paper (chartaceos). The former of these are in most esteem. With regard to the character, these codes are written either in square and capital letters, or in half square, or round and small letters.

There are no intervals between the words, no letters different from the others at the beginning of any word, no points, nor any other distinction. The codes which are wrote in letters that are half square, resemble those we have in Gothic characters, as well for the age as the form of the letters. Such as are wrote in round letters are not so ancient as the former, and do not go higher than the ninth or tenth century. These have spaces between the words, and some punctuation. They are likewise not so well wrote as the preceding, and are frequently disfigured with comments. The codes are divided, according to the country, into Lombard, Italian, Gaulic, Franco-Gallic, Saxon, Anglo-Saxon, &c.

8. In the ancient Greek books, they frequently terminated the periods of a discourse, instead of all other division, by lines; and these divisions were called, in Latin, versus, from versere: for which reason these lines are still more properly named versus than lines. At the end of a work they put down the number of verses of which it consisted, that the copies might be more easily collated: and it is in this sense we are to understand Trebonius, when he says, that the pandects contain 150,000 pene versuum. These codes were likewise vel probe vel deterioris nota: more or less perfect, not only with regard to the calligraphy or beauty of the character, but to the correction of the text also.

9. It is likewise necessary to observe, in ancient codes, the abbreviations, as they have been used in different centuries. Thus, for example, A. C. D. signifies, Anus Caius Decimus; Ap. Cn. Appius Cneius; Aug. Imp Augustus Imperator. The characters that are called nota: are such as are not to be found in the alphabet; but which, notwithstanding, signify certain words. All these matters are explained in a copious manner by Voiius, and in the Chronicon Gotvicense. Lastly, the learned divide all the ancient codes into codices minus raros, rariorer, ed. ext. &c. The critical art is here indispensably necessary; its re-searches, moreover, have no bounds; and the more, as the use of it augments every day, by the discoveries that are made in languages, and by the increase of erudition.

DIPONDIUS, in the scripture-language, is used by St Luke to signify a certain coin which was of very little value. Our translation of the passage is, "Are not two farrows fold for two farthings?" In St Matthew, who relates the same thing, we read "Are not two far­rous; fold for a farthing?" The Greeks reads affirmation instead of as. Now affirmation, as some say, was worth half an as, that is to say, four French deniers and 1/10; and, according to others, two deniers and 1/10ths. Dipondius seems rather to signify half an as. Calmet, Diction. Bibl. Luke xii. 6. Matt. x. 29.

Dr Arbuthnot differs in opinion from the author last quoted. He says, that this coin was at first libra­lis, or of a pound weight; and even when diminished, it retained the name of libella. So that dipondius denotes two ayes.

DIPPING, among miners, signifies the interruption
tion or breaking of the veins of ore; an accident that
gives them a great deal of trouble before they can di-
cover the ore again. A great deal of the fall of the
miners consists in the understanding this dipping of the
veins, and knowing how to manage in it. In Corn-
wall they have this general rule to guide them in this
respect: most of their tin-loads, which run from east
to west, constantly dip towards the north. Sometimes
they underlie; that is, they slope down towards the
north three feet in height perpendicular. This must
carefully be observed by the miners, that they may
understand where to make their air-shafts when oc-
casion requires; yet, in the higher mountains of Dart-
moor, there are some considerable loads, which run
north and south; these always underlie toward the
east.

Four or five loads may run nearly parallel to each
other in the same hill; and yet, which is rare, they
may meet altogether in one hatch, as it were a knot,
which well tins the place, and so separate again, and
keep their former distances.

Dipping-Needle, an instrument used for observing
the quantity of inclination towards the earth, caused
by any needle or other body after it has acquired the
magnetic virtue. This was first observed by one Ro-
bert Norman, an Englishman, and maker of compa-
isses, in the end of the 16th century; who found
that he was always obliged to counterbalance
the quantity of inclination towards the earth.

He supposed the earth itself to be the large mag-
net, and the magnetic needle or any other magnetic
body the small magnet in the experiment; for ad-
mitting that the north pole of the earth possesses a
south magnetism, and that the opposite pole is poise-
ied of a north magnetical polarity: it appears, and the
theory is confirmed by experiment, that when a mag-
net is suspended properly in the equatorial parts of
the world, it must remain in an horizontal position;
but when removed nearer to one of the poles, it
must incline one of its extremities, viz., that which is
poised of the contrary magnetic polarity; and that
this inclination must increase in proportion as the
magnet or magnetic-needle recedes from the equator
of the earth; and, lastly, when brought exactly upon
either of the poles of the earth, it must stand perpen-
dicular to the ground, or in the same direction with
the axis of the earth.

The only difficulty in this explanation arises from
the attributing a south magnetism to the north pole
of the earth: but by this our author means only that
its magnetism is contrary to that end of the magnetic
needle which turns towards it; and in the same man-
er it must be understood, that the south pole of the
earth has a north magnetic polarity.

If the extremities of the axis of the earth, or the
poles about which it performs its diurnal revolution,
coincided with its magnetic poles, or even if the mag-
netic poles were always at a certain distance from
them, the inclination of the needle would be always the same
at equal distances from the equator, and might be very
useful for determining the latitudes. But it would
seem, that these poles are perpetually shifting their
place, since both the inclination and horizontal direc-
tion of the needle are continually varying even in the
same place; so that its quantity of inclination cannot
be exactly calculated. Two general remarks may be
made upon this subject. 1. That the inclination of
the needle does not alter regularly in going from north
to south, or from south to north, in any meridian.
2. That its alteration in the same place, and at dif-
cerent times, is but small. Thus, in London, about
the year 1576, the dip was 71° 50' below the horizon, and
in 1775 it stood at 72° 3'; the alteration in near 200
years
Dipping-Needle, Dipus.

The general method of constructing dipping-needles is, to pass an axis quite through the needle itself, and to let the extremities of the axis rest upon two supports, like the beam of a pair of scales, that the needle may move vertically round; and hence, when placed in the magnetic meridian, it will naturally be perpendicular to the horizon.

The degrees of this inclination are shown upon a graduated circle; and when the instrument is made use of at land it has, but at sea a ring is necessary to suspend it. When furnished with a stand, it has also a spirit-level; and the stand has three screws, by which the whole is adjusted in such manner as to let the centre of motion in the needle, and the mark of 90° on the lower part of the divided circle, be exactly in the same line perpendicular to the horizon.

The greatest imperfections attending this instrument are the balancing of the needle itself, and the difficulty of knowing whether, after being made magnetic, it be properly balanced or not. The inaccuracy here indeed can be but very small, as arising only from dust or moisture. The method recommended by Mr. Cavallo to obviate these inconveniences, is first to observe the dip of the needle; then to reverse its magnetism by the application of magnets; so that the end of the needle may agree with the magnetic meridian, it will naturally be perpendicular to the horizon.

It is shown that the ends nearly north and south, and one of the divided degrees of this inclination are the balancing of the needle itself, and the mark of the divided circle, exactly in the same line perpendicular to the horizon.

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Dipsacus, Teazel, in botany: A genus of the monogynia order, belonging to the terrandia clas of plants; and in the natural method ranked under the 48th order, Aggregate. The common calyx is polyphyllous, proper above; the receptacle paleaceous. There are four species; the most remarkable of which is the cardus funlonum, which grows wild in many parts of England. It is of singular use in raising the nap upon woollen cloth. For this purpose the heads are bound or packed in a large broad wheel, which is made to turn round, and the cloth is held against them. In the west of England, great quantities of the plant are cultivated for the use just now mentioned. It is propagated by fowling the seeds in March, upon a soil that is well prepared. About one peck of seed is sufficient for an acre, as the plants must have room to grow; otherwise the heads will not be large enough, nor in great quantity. When the plants come up, they must be hoed in the same manner as is practised for turnips, cutting down all the weeds, and thinning the plants to about eight inches distance; and as the plants advance, and the weeds begin to grow again, they must be hoed a second time, cutting out the plants to a wider distance, so that they may finally stand a foot distant from each other. The second year they will shoot up heads, which may be cut about the beginning of August. They are then to be tied up in bunches, and left in the sun if the weather is fair; or if not, in rooms to dry them. The common produce is about 160 bundles or flaves upon an acre, which are sold for one shilling each.

The leaves of the common wild teazel, dried, and given in powder or infusion, are a very powerful remedy against flatulences and crudities in the stomach. There is also another, though somewhat whimsical use for which this plant is famous among the country people in England. If the heads are opened longitudinally, about September or October, there is generally found a small worm in them: one of these only is found in each head, whence naturalists have named it the vermis folitarius dipus. They collect three, five, or seven of these, always observing to make it an odd number; and heating them up in a quill, give them to be worn as an amulet against the ague. This superstitious remedy is in much higher repute than the bark in many parts of England.

Dipsas, a sort of serpent, the bite of which produces such a trait as proves mortal; whence its name dipsas, which signifies thirsty. In Latin it is called sitiua, "c a pill." Moses speaks of it in Deut. viii. 15.

Diptera (from διπτός & πτερόν, wing), in zoology, an order of insects, which have only two wings, and under each wing a style or oblong body, terminated by a proboscis or head, and called a balancer.

Diptotes, in grammar are such nouns as have only two cases, as suppez, suppezia, &c.

Diptycha, in antiquity, a public register, wherein were written the names of the consuls, and other magistrates among the heathens; and of bishops, and deans as well as surviving brethren, among the Christians.

The word is formed from the Greek διπτυχος, or διπτυχος, and that from διπτυκός, a masculine noun derived from διπτός fold or plait. From its future διπτυχει is formed διπτυχι a fold or plait, to which is adding διπτυχ, in the genitive διπτυχος, whence the nominative neuter διπτυχος, p. q. a book folded in two leaves; though there were some in three, and others in four or five leaves. An ingenious author imagines this name to have been first given them to distinguish them from the books that were rolled, called volumina.

It is certain that there were profane diptracha in the Greek empire as well as sacred ones in the Greek church. The former were the matricula, or register, wherein the names of the magistrates were entered; in which senfe diptrycha is a term in the Greek chancery.

Sacred Diptrycha. The word is plural; diptrycha being a double catalogue, in one whereof were written the names of the living, and in the other those of the dead, which were to be rehearsed during the office.

We meet with something not unlike the sacred diptrychs of the Greeks in the canon of the mass according to the Italian usage; where the people are enjoined to pray once for the living, and once for the dead; several saints are invoked in different times, &c. In these diptrycha were entered the names of bishops, who had governed their flocks aright; and these were not expired out of the fame, unless they were convicted of hereby, or some other gross crime. In the diptrycha were likewise entered the names of such as had done any signal service to the church, whether they were living.
living or dead, and mention was made of them in the
ceremony of the liturgy.

Cafabon, in his observations on Athenaeus, lib. vi.
cap. 14, supposes the Christians to have borrowed the
certain sacred names in a book, and rehearsing
them at maen, from the heathens, who entered the
names of persons they would do any signal honour to,
in the vefels of the Salii: as was done to Germanicus
and Verus, sons of the emperor Marcus Aurelius, and
long time before, during the age of the republic, to
Mamureus Veteranus, and Lucia Volumnia, as we are
told by Tacitus, lib. ii. Spartan, Ovid, Festus, Plut.
arch, &c. Bur Fa. Rotweyd does not approve this
notion of Cafaubon. The pretended St Dionysius,
A very ancient author, says the contrary, and afferts the
first establishment of this usage to have been founded
on Scripture, 2 Tim. ii. 19. Psalm cxvi. 15. Rotweyd
adds Ecclesiastic. xlv. 1 and takes these to have
been the passages the ancient church had a view to,
rather than the Salian verses.

The profane diptycha were frequently sent as pre-
seats to princes, &c. on which occasion they were fine-
gift, and embellished; as appears from Symmachus,
lib. ii. ep. 81. Thofe presented were uffually of ivory.
The firft law, De Expenf. Ludor. C. Theod. forbids
all magistrates below counils to make presents of dip-
tyca of ivory in the public ceremonies.

DIRCA, in botany: A genus of the monogynia
order, belonging to the octandria clafs of plants; and
in the natural method ranking under the 31ft order.
Veprucula. There is no calyx; the corolla istubular,
with the limb indiftinguid, the flamin a longer than
the tube; the berry is monoperoous.

DIRÆ, the general name of the three Furies in the
Pagan fystem of theology. They were fo called, as being-
qua Dieum ira, the minimfers of divine venge-
ance in punihing guilty fouls after death. They
were the daughters of Night and Acheron. See Furies.

DIRECTION, in mechanics, signifies the line or
path of a body's motion, along which it endeavours to
proceed according to the force impressed upon it. See
Mechanics.

DIRECTOR, in commercial polity, a perfon who
has the management of the affairs of a trading company;
thus we fay, the directors of the India company,
South-sea company, &c. See Company.

The directors are confiderable proprietors in the
flocks of their refpective companies, being chosen by
plurality of votes from among the body of proprietors.
The Dutch East India company have 60 such direc-
tors; that of France, 21; the British East India
company has 24, including the chairman, who may be
reelected for four years successively. These have fa-
faries of 1500, 2-year each, and the chairman 2000.
They meet at leaft once a-week, and commonly of-
tener, being summoned as occasion requires. The
directors of the Bank of England are 24 in number,
including governor and deputy governor.

DIRECTOR, in surgery, a grooved probe, to direc-
ethe edge of the knife or fciar in opening fionuses or
fifltakes, that by this means the adjacent veffel, nerves,
and tendons, may remain unhurt. See Surgery.

DIRBITORES, among the Romans, oficers ap-
pointed to distribute tablets to the people at the co-
mitia. See Comitia.

DIRIGENT, or DIRECTRIX, a term in geometry,
signifying the line of motion, along which the deci-
lent line or face is carried in the genesis of any
plane or fold figure.

DIS, an inseparable article prefixed to divers words;
the effect whereof is either to give them a signification
 contrary to what the simple words have, as dife-
blige, disfavour, &c.; or to signify a separation, detach-
ment, &c. as disjoining, distributing.

DIS, a town of Norfolk, seated on the river Way-
ney, on the side of a hill. It is a neat flourishing town,
with one large church, a Presbyterian and a Quaker
meeting. It has about 600 good houses, the streets
are well paved, pretty wide, and always clean. At
the west end of the town is a large mear or lake;
but so muddy, that the inhabitants can make no other life
of it but in catching of eels. In the town are carried
on manufactures of sail-cloth, hofe, and the making
of flays. E. Long. 1. 16. N. Lat. 52. 25.

DIS, a god of the Gauls, the fame as Pluto the
god of hell. The inhabitants of Gaul supposed them-
  selves descended from that deity.

DISA, in botany: A genus of the diandria order,
belonging to the gynandria clafs of plants. The
  spatha is univalvar; the petals three; the third smaller
  than the reft, bifid, and gibbous at the bafe.

DISABILITY, in English law, is when a man is dis-
abled, or made incapable to inherit any lands, or take
that benefit which otherwise he might have done: and
this may happen four ways: by the act of an ancestor,
or of the party himself; by the act of God, or of the
law. 1. Disability by the act of the ancestor, is where
the ancestor is attainted of high treason, &c., which
corrupts the blood of his children, so that they may
not inherit his estate. 2. Disability by the act of the
party, is where a man binds himself by obligation, that,
upon surrender of a lease, he will grant a new estate
  to a lessee; and afterwards he grants over the rever-
  sion to another, which puts it out of his
  power to perform it. 3. Disability by the act of God,
is where a man is non sine memoria; whereby he is incapable
to make any grant, &c. So that, if he paffeth an es-
  tate out of him, it may after his death be made void;
but it is a maxim in law, " That a man of full age
shall never be received to disable his own perfon." 4.
Disability by the act of the law, is where a man by the
fale act of the law, without any thing by him done,
is rendered incapable of the benefit of the law; as an
alien born, &c.

DISANDRA, in botany: A genus of the digynia
order, belonging to the heptandria clafs of plants. The
calyx has feven leaves; the corolla parted into
fuch classes of plants; and

DISAPPOINTMENT, is where a man is incapable
for the reason he gave them their name from the shores
16. They were discovered by Commodore Byron in
1765, who gave them their name from the shores af-
fording no anchorage for his ships; for which reaon
he was obliged to quit them without landing, or pro-
curing any refreshments for his crew who were then
languishing with ficknefs. They are inhabited by
Indians, who appeared on the beach with fpars in their
hands, that were at leaft 16 feet long. They every
where discovered hostile intentions, and seemed by signs
to threaten the people in the boat with death if they
came ashore. There are cocoa-trees in great abundance, and the shore abounds with turtle.

DISC, in antiquity, a quoit made of stone, iron, or copper, five or six fingers broad, and more than a foot long, inclining to an oval figure, which they hurled in form of a bowl, to a vast distance, by the help of a leathern thong tied round the person's hand who threw it, and put through a whole in the middle. Homer has made Ajax and Ulysses great artists at this sport.

Disc, in astronomy, the body and face of the sun and moon, such as it appears to us on the earth; or the body and face of the earth, such as it appears to a spectator in the moon.

Disc, in optics, is the width of the aperture of telescopic glasses, whatever their form be, whether plain, convex, concave, &c.

Discerning, or discernment, a faculty of the mind whereby it distinguishes between ideas. See Metaphysics.

Disciple, one who learns any thing from another: thus, the followers of any teacher, philosopher, &c. are called discipiles. In the Christian sense, they were followers of Jesus Christ, in general; but in a more restrained sense, the disciples denote those alone who were the immediate followers and attendants on his person, of which there were 70 or 72. The names disciple and apostle are often synonymously used in the gospel-history; but sometimes the apostles are distinguished from disciples, as persons selected out of the number of disciples, to be the principal ministers of his religion: of these there were only 12. The Latins kept the festival of the 70 or 72 disciples on July 15th, and the Greeks on January 4th.

Discipline, in a general sense, denotes instruction and government, as military discipline, ecclesiastical discipline, &c.

Ecclesiastical discipline consists in putting those laws in execution by which the church is governed, and inflicting the penalties enjoined by them against the several sorts of offenders that profess the religion of Jesus. The primitive church never pretended to exercise discipline upon any but such as were within the pale, in the largest sense, by some act of their own profession; and even upon those she never pretended to exercise her discipline so far as to cancel or disannul their baptism: all that she pretended to was to deprive men of the benefits of external communion, such as public prayer, receiving the eucharist, and other acts of divine worship. The church-discipline was only confined to the admonition of the party, and to the lesser and greater excommunication.

As to the objects of ecclesiastical discipline, they were all such delinquents as fell into great and scandalous crimes after baptism.

Discipline, in a more peculiar sense, is used for the chastisement or bodily punishments inflicted on a religious of the Roman church, who has been found a delinquent; or even for that which the religious voluntarily undergo or inflict on themselves, by way of modification.

Book of Discipline in the history of the church of Scotland, is a common order, drawn up by the assembly of ministers in 1660, for the reformation and uniformity to be observed in the discipline and policy of the church. In this book the government of the church by prelates is set aside, church-fellows are established, the superstitious observation of fast-days and saints days is condemned, and other regulations for the government of the church are determined. This book was approved by the privy council, and is called the first book of discipline.

Discord, in general, signifies disagreement, or opposition between different persons or things.

Discord, in music, every sound which, joined with another, forms an assemblage disagreeable to the ear; or rather, every interval whose extremes do not coincide. Now, as there are no other concords or consonances, except those which form amongst themselves, and with their fundamental sound, perfect chords, it follows, that every other interval must be a real dissonance or discord: even the third and sixth were reckoned such among the ancients, who excluded them from the number of consonant chords.

The term dissonance, which is synonymous with discord, is compounded of two words, the inseparable preposition dis and the verb sonare; which, both in a literal and metaphorical sense, signifies dissonance or dissonation. In reality, that which renders dissonances grating, is, that the sounds which form them, far from uniting in the ear, seem to repel each other, and are heard each by itself as two distinct sounds though produced at the same time.

This repulsion or violent oscillation of sounds is heard more or less as the vibrations which produce it are more or less frequently coincident. When two vocal strings are gradually tuned, till they approach a consonant interval, the pulsations become slower as produced at the same time.

As to these few, such as are agreeable to the ear, we exclude all intervals which are not more or less exact and frequent coincidence of vibrations; though the reason why this coincidence should give pleasure, more than any other modification or combination of sounds, appears to us indiscernible. The agreeable effects of dissonance in harmony are no objections to this theory; since it is allowed, that the sensations excited by discord are not in themselves immediately and necessarily pleasing, but only pleae by auricular deception. The ear is surprized with the shock it receives, without being able to imagine how it should have happened; and in proportion as it is harsh and grating, we feel the pleasure of returning harmony enhanced, and the disappointment of being artfully and insensibly extricated more agreeable.

The name of dissonance is given sometimes to the interval, and sometimes to each of the two sounds which form it. But though two sounds equally form a dissonance between themselves, the name is most frequently given to that found in particular which is most extraneous to the chord.

The number of possible dissonances is indefinite; but as in music we exclude all intervals which are not found in the system received, the number of dissonances is reduced to a very few: besides, in practice, we can only select from these few, such as are agreeable to the species, and the mode in which we compose; and from this
DISCOURSE, (the gods of), in Pagan theology. She is represented by Astartes with fiery eyes, a pale countenance, livid lips, and wearing a dagger in her bosom. It was she who, at the marriage of Peleus and Thetis threw in the golden apple, whereon was written "To the fairest," which occasioned a contention between the goddesses Juno, Minerva, and Venus; each pretending a title to the apple. She was likewise called Ars and Eris.

DISCOVERY, in dramatic poetry, a manner of unravelling a plot or fable in tragedies, comedies, and romances; wherein, by some unforeseen accident, a discovery is made of the name, fortune, quality, &c. of a principal person, which were before unknown. See CATASTROPHE.

DISCOUNT, in commerce, a term among traders, merchants, and bankers. It is used by the two former on occasion of their buying commodities on the usual time of credit, with a condition that the seller shall allow the buyer a certain discount at the rate of so much per centum per annum, for the time for which the credit is generally given, upon condition that the buyer pays ready money for such commodities, instead of taking the time of credit. Traders and merchants also frequently taking promissory notes for moneys due payable to them or order at a certain time, and sometimes having occasion for money before the time is elapsed, procure these notes to be discounted by bankers before the time of payment. Bills of exchange are also discounted by bankers; and in this consists one article of the profits of banking. See BANK.

DISCRETE, or DISJUNCT, PROPORTION, is when the ratio of two or more pairs of numbers or quantities is the same, but there is not the same proportion between all the four numbers. Thus if the numbers 3 : 6 : 8 : 16 be considered, the ratio between 3 : 6 is the same as that between 8 : 16, and therefore the numbers are proportional; but it is only discreetly or disjunctly, for 3 is not to 6 as 6 to 8; that is, the proportion is broken off between 8 and 3, and is not continued as in the following continual proportionals, 3 : 6 : 12 : 24.

DISCRETION, prudence, or knowledge to govern one's self.

There are many more shining qualities in the mind of man, but there is none so useful as discretion; it is this indeed that gives a value to all the rest, which sets them at work in their proper times and places; and turns them to the advantage of the person who ispossessed of them. Without it learning is pedantry, and wit impertinence; virtue itself looks like weakness; the best parts only qualify a man to be more frightfully in errors, and active to his own prejudice.

Nor does discretion only make a man master of his own parts, but of other mens. The discreet man finds out the talents of those he converses with, and knows how to apply them to proper uses. Accordingly, if we look into particular communities and divisions of men, we may observe that it is the discreet man, not the witty, nor the learned, nor the brave, who guides the conversation, and gives measure to the society. A man with great talents, but void of discretion, is like Polyphemus in the fable, strong and blind, ended with an irresistible force, which for want of light is of no use to him. Though a man has all other perfections, and wants discretion, he will be of no great consequence in the world; but if he has this single talent in perfection, and but a common share of others, he may do what he pleases in his particular station of life.

It is proper, however, to distinguish between discretion and cunning, the latter being the accomplishment only of little mean ungenerous minds. Discretion points out the noblest ends to us, and pursues the most proper and laudable methods of attaining them: cunning has only private selfish aims, and flacks at nothing which may make them succeed. Discretion has large and extended views, and, like a well-formed eye, commands a whole horizon: cunning is a kind of short-sightedness, that discovers the minutest objects which are near at hand, but is not able to discern things at a distance. Discretion, the more it is discovered, gives the greater authority to the person who possesses it: cunning,
cunning, when it is once detected, loses its force, and makes a man incapable of bringing about even those events which he might have done, had he palled only for a plain man. Discretion is the perfection of reason, and a guide to us in all the duties of life; cunning is a kind of inclination, that only looks out after our immediate interest and welfare. Discretion is only found in men of strong sense and good understanding; cunning is often to be met with in brutes themselves, and in persons who are but the fewest removes from them. In short, cunning is only the mimic of discretion, and may pass upon weak men, in the same manner as vivacity is often mistaken for wit, and gravity for wisdom.

DISCUS, in antiquity. See Disc.

DISCUS, in botany, the middle part of a radiated compound flower, generally consisting of small florets, with a hollow regular petal. It is commonly surrounded by large, plain, or flat, tongue-shaped petals, in the circumference or margin; as in daffy, groundsel, and leopards bane: sometimes the circumference is naked, as in cotton-weed and some species of Biscutum, and in Statistics, the surface of the leaf.

DISCUSSION, in matters of literature, signifies the clear treating or handling of any particular point, or problem, so as to shake off the difficulties with which it is embarrassed: thus we say, such a point was well discussed, when it was well treated of and cleared up.

DISCUTIENS, in medicine, are such remedies, as, by their subtility, dissolve a flagrant or conglutinated fluid, and dissipate the same without an external solution of continuity.

DISDIACLASTIC CRYSTAL, in natural history, a name given, by Bartholine and some others, to the pellucid foifie substance, more usually called, from the place whence it was first brought, Iceland crystal: tho' properly it is no crystal at all, but a fine pellucid spar, called by Dr Hill, from its shape, parallolipipedum. See Island Crystal.

DISDIAPASON, or Bisdiapason, in music, a compound concord, described by F. Parran, in the quadruple ratio of 4: 1, or 8: 2.

DISDIAPASON Diapente, a concord in a sextuple ratio of 1: 6.

DISDIAPASON Semi-Diapente, a compound concord in the proportion of 16: 3.

DISDIAPASON Diatone, a compound concord in the proportion of 24: 5.

DISEASE, has been variously defined by physicians, almost every founder of a new system having given a definition of disease, differing in some respects from his predecessors. For a particular account of these definitions, see Medicine.

Of all animals, man is subject to the most diseases; and of men, the studious and speculative are most exposed thereto. Other animals have their diseases; but they are in small number: nor are plants without them; though their maladies scarce exceed half a score. The ancients defined their diseases. Some diseases only impair the use of the part immediately affected; as the phthisia, gout, &c. Others destroy it entirely; as the gutta pernna, palsy, &c. Some affect the whole body; as the fever, apoplexy, epilepsy, &c. Others only impair a part; as the atheria, colic, dropsy, &c. Some only affect the body; as the gout: others disturb the mind; as melancholy, delirium, &c. Lastly, others affect both the body and mind; as the mania, phreny, &c.

The colder the country, in general, the fewer and the lesser violent are the diseases. Scheffer tells us that the Laplanders know no such thing as the plague, or fevers of the burning kind, nor are subject to half the distempers we are. They are robust and strong, and live to 80, 90, and many of them to more than 100 years; and at this great age they are not feeble and decrepid as with us; but a man of 90 is able to work or travel as well as a man of 60 with us. They are subject, however, to some diseases more than other nations: thus they have often distempers of the eyes, which is owing to their living in smoke, or being blinded by the snow. Pleurisy and inflammations of the lungs are also very frequent among them; and the small-pox often rages with great violence. They have one general remedy against thefe and all other internal diseases; this is the root of that fort of mofs, as Scheffer expresses it, which they call junct. They make a decoction of this root in the whey of rein-deer milk, and drink very large doses of it warm, to keep up a breathing sweat; if they cannot get this, they use the taffks of angeliac boild in the same manner: they have not so great an opinion of this as of the other remedy; but the keeping in a sweat, and drinking plentifully of diluting liquors, may go a great way in the cure of their diseases, whether either the one or the other of the drugs have any virtue or not. They cure pleurisy by this method in a very few days; and get so well through the small-pox with it, that very few die of it.

It has been always observed, that people of particular places were peculiarly subject to particular diseases, which are owing to their manner of living, or to the air and effluvia of the earth and waters. Hoffman has made some curious observations on diseases of this kind. He observes, that swellings of the throat have always been common to the inhabitants of mountainous countries: and the old Roman authors say, Who wonders at a swelled throat in the Alps? The people of Swfferland, Carynthia, Styria, the Hartz forest, Transylvania, and the inhabitants of Cronstadt, he observes, are all subject to this disease from the same cause.

The French are peculiarly troubled with fevers, with worms, and with hydrocles and farcoceles; and all these disorders seem to be owing originally to their eating very large quantities of chestnuts. The people of Britain are peculiarly afflicted with hoarfeness, catarrhs, coughs, dysenteries, consumptions, and the scurvy; and the women with the flor albus or whites; and children with a disease scarce known elsewhere: which we call the rickets. In different parts of Italy different diseases reign. At Naples the venereal disease is more common than in any other part of the world. At Venice, people are peculiarly subject to the bleeding piles. At Rome, tertian agues and lethargic distempers are most common. In Tuscany, the epilepsy or falling sickness. And in Apulia they are most subject to burning fevers, pleurisy, and to that fort of madness which is attributed to the bite of the tarantula.
DISEASES of Horfe.

DISEASES of Dogs. See DOGS.

DISEASES of Plants. See AGRICULTURE, no 69, et seq. and BRIGHT, MILDW, &c.

DISMISB. When a ship passes out of the mouth of some great gulf or bay, they call it disemboague. They lay also of a river, that at such a place, or after it has run so many leagues, it disemboogues itself into the sea.

DISPERSION, among civilians, signifies the depriving a person of the rights and privileges of a free citizen or subject.

DISOJUSE, a counterfeit habit. Perions doing unlawful acts in disguise are by the statutes sometimes subject to great penalties, and even declared felons. Thus by an act, commonly called the black act, persons appearing disguised and armed in a forest or grounds inclosed, or hunting deer, or robbing a warden or a fish-pond, are declared felons.

DISPISH, in mining, is a trough made of wood, about 28 inches long, four inches deep, and six inches wide; by which all miners measure their ore. If any be taken telling their ore, not first measuring it by the bar-mallter's dish, and paying the king's duty, the seller forfeits his ore, and the buyer forfeits for every future offence 40 shillings to the lord of the field or farmer.

DISJUNCTIVE, something that separates or disjoins. Thus, or, neither, &c. which in connecting a discourse yet separate the parts of it, are called disjunctive conjunctions.

DISK. See DIS.

DISLOCATION, the putting a bone out of joint by some violence, usually called by the physicians luxation.

DISMISSION of a BILL, in chancery. If the plaintiff does not attend on the day fixed for the hearing, his bill is dismissed with costs. It may be also dismissed for want of prosecution, which is in the nature of a non-suit at law, if he suffers three terms to elapse without moving forward in the cause.

DISMOUNTING, in the military art, the act of unhorning. Thus, to dismount the cavalry, the dragonets, or the like, is to make them alight. To dismount the cannon, is to break their carriages, wheels, and axle-tree, so as to render them unfit for service. Horses are also dismounted when they are rendered unfit for service.

DISPARAGEMENT, in law, is used for the matching an heir, &c. in marriage, below his or her degree or condition, or against the rules of decency. The word is a compound of the privative particle dis, and par, "equal."

DISPART, in gunnery, is the setting a mark upon the muzzle-ring, or thereabouts, of a piece of ordnance, so that a sight-line taken upon the top of the base-ring against the touch-hole, by the markmen or near the muzzle, may be parallel to the axis of the conical cylinder. The common way of doing this, is to take the two diameters of the base ring, and of the place where the dispart is to stand, and divide the difference between them into two equal parts, one of which will be the length of the dispart which is set on the gun with wax or pitch, or fastened there with a piece of twine or marlin. By means of an instrument it may be done with all possible nicety.

DISPATCH, a letter on some affair of state, or other business of importance, sent with care and expedition, by a courier express. The business of dispatches in England lies on the secretaries of state and their clerks. The king gives directions to his ministers abroad by dispatches. The word is also used for the packet or bundle of letters. The French, during the reign of Louis XIV, had a confiit des depeches, "council of dispatches," held in the king's presence, at which the dauphin, the duke of Orleans, the chancellor, and four secretaries of state, aslided.

DISPAPER. A person facing in forma pauperis, is said to be dispapered, if, before the suit is ended, he has any lands or other estate fallen to him, or if he has any thing to make him lose his privilege. See the article Forma pauperis.

DISPENSARY, or DISPENSATORY, denotes a book containing the method of preparing the various kinds of medicines used in pharmacy. Such are those of Bauderon, Quercetan, Zwelty, Charas, Bates, Metue, Salmon, Lernery, Quincy, &c. but the latest and most esteemed, beside the London and Edinburgh Pharmacopoeias, is the Edinburgh New Dispensatory, being an improvement upon that of Dr Lewis's.

DISPENSARY, or Dispensatory, is likewise a magazine or office for selling medicines at prime cost to the poor. The college of physicians maintain three of these in London; one at the college itself in Warwick-lane; another in St Peter's alley, Cornhill; and a third
in St Martin's lane. Dispensaries have also been established in several of the principal towns in Scotland and England; particularly in Edinburgh, Dundee, and Kello; as also at Newcastle upon Tyne: and lately in Philadelphia in Pennsylvania.

DISPENSATION, in law, the granting a license of doing some certain action that otherwise is not permitted.

DISPERSION, in general, signifies the scattering or dissipating something. Hence,

Dispersion, in optics, the same with the divergency of the rays of light.

Point of Dispersion, in dioptrics, the point from which refracted rays begin to diverge, where their refraction renders them divergent.

Dispersion of Inflammation, in medicine and surgery, is removing the inflammation, and restoring the inflamed part to its natural state.

Dispersion of Mankind, in the history of the world, was occasioned by the confusion of tongues, and took place in consequence of the overthrow of Babel at the birth of Peleg; whence her name; and it appears by the account given of his ancestors, Gen. chap. xi. 10—16. to have happened in the 101st year after the flood according to the Hebrew chronology, and by the Samaritan computation in the 40th. However, various difficulties have been suggested by chronologers concerning the true era of this event. Sir John Marsham and others, in order to reconcile the Hebrew and Egyptian chronologies, maintain a dispersion of mankind before the birth of Peleg. Others, unable to find numbers sufficient for the plantation of colonies in the space of 101 years, according to the Hebrew computation, fix the dispersion towards the end of Peleg's life, thus following the computation of the Jews. Petavius affigns the 153d year after the flood; Cumberland the 180th; and Usher, though he generally refers it to the time of Peleg's birth, in one place affigns the 131st after the flood for this event. Mr Shuckford supposes the dispersion to have been gradual, and to have commenced with the separation of some companies at the birth of Peleg, and to have been completed 31 years after. According to the calculation of Petavius, the number of inhabitants on the earth at the birth of Peleg amounted to 32,768; Cumberland makes them 30,000: Mr Meade affixes them at 7000 men besides women and children; and Mr Whitton, who supposes that mankind now double themselves in 400 years, and that they doubled themselves between the deluge and the time of David in 60 years at a medium, when their lives were fix or seven times as long as they have been since, by his computation produce about 2389: a number much too inconsiderable for the purposes of separating and forming distinct nations. This difficulty induced Mr Whitton to reject the Hebrew and to adopt the Samaritan chronology, as many others have done; which, by allowing an interval of 401 years between the flood and the birth of Peleg, furnishes, by the last mentioned mode of computation, more than 240,000 persons.

As to the manner of the dispersion of the poverty of Noah from the plain of Shinar, it was undoubtedly conducted with the utmost regularity and order. The sacred historian informs us, that they were divided in their lands; every one according to his tongue, according to his family, and to according to his nation, according to his speech. Gen. x. 5, 20, 31; and thus, as Mr Mede observs, they were ranged according to their nations, and every nation was ranged by their families; so that each nation had a separate lot, and each family in every nation. The following abstract will serve to give a general idea of their respective settlements:

Japhet, Noah's eldest son, had seven sons: viz. Gomer, whose descendants inhabited those parts of Asia which lie upon the Egean Sea and Hellespont northward, containing Phrygia, Pontus, Bithynia, and a great part of Galatia. The Galatians, according to Josephus, were called Gomeri; and the Cimmeri, according to Herodotus, occupied this tract of country: and from these Cimmerians, Cimmeri, or Celts, Mr Camden derives our ancient Britons, who still retain the name Cymro or Cymru. Magog, the second son of Japhet, was probably the father of the Scythians on the eait and north-east of the Euxine Sea. Madai planted Media, though Mr Mede affigns Macedonia to his share. Javan was the father of the Grecians about Ionia, whose country lies along upon the Egean Sea; the radicals of Javan and Ionia being the same 20. To Tubal and Melchec belonged Cappadoce and the country which lies on the borders of the Euxine Sea; and from them, migrating over the Caucasus, it is supposed the Russians and Moscovites are descended: And Tiras occupied Thrace. The sons of Schem were five: Elam, whose country lay between the Medes and Mesopotamians, and was called by the Gentile writers Elamais; and Josephus calls the Elamites the founders of the Perians: Ahar, who was driven out of Shinar by Nimrod, afterwards settled in Asia, and there built Nineveh and other cities: Arphaxad, who gave name to the country which Ptolemy calls Araphacitis, a province of Asia; though Josephus makes him the father of the Chaldees: Lud, who inhabited and gave name to the country of Lydia about the river Maeander, remarkable for its winding, in Asia Minor; and Aram, the father of the Syrians. Ham, the youngest son of Noah, had four sons: viz. Cuh, whose posterity spread into the several parts of Arabia, over the borders of the land of Edom, into Arabia Felix, up to Midian and Egypt: Mizraim, the father of them who inhabited Egypt and other parts of Africa: Phut, to whom Bochart affigns the remaining part of Africa, from the lake Tritonides to the Atlantic Ocean, called Lybia; and Canaan, to whom belonged the land of Canaan, whence the Phoenicians derived their origin.

Dr Bryant has advanced a new hypothesis on this subject, and supported it with his usual acuteness and learning. He maintains, that the dispersion as well as the confusion of tongues was local, and limited to the inhabitants of the province of Babel; that the separation and distribution recorded to have taken place in the days of Peleg, Gen. x. 25, 31, 32, which was the result of Divine appointment, occasioned a general migration; and that all the families among the sons of men were concerned in it. The house of Shem, from which the Melchiah was to spring, was particularly regarded in this distribution; the portion of his children was near the place of separation; they in general had Asia to their lot; as Japhet had Europe, and Ham the large continent of Africa. But the sons of Chus would not
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submit to the divine dispensation; they went off under the conduct of Nimrod, and seem to have been for a long time in a roving state. However, at last they arrived at the plains of Shinar; and having ejected Albur and his sons, who were placed there by Divine appointment, seized his dominions, and laid their foundation of a great monarchy. But afterwards fearing lest they should be divided and scattered abroad, they built the tower of Babel as a landmark to which they might repair; and probably to answer the purposes of an idolatrous temple, or high altar, dedicated to the Cuthites, and their might repair; and probably to a denomination applied in Poland to those of the Lutheran, Calvinistic, and Greek profession. The king of Poland engages by the paella conventa to tolerate them in the free exercise of their religion, but they have often had reason to complain of the violation of their promises. See (History of) Poland.

DISSENIERS, separatists from the service and worship of any established church.

DISIDENTS, a denomination applied in Poland to those of the Lutheran, Calvinistic, and Greek profession. The king of Poland engages by the paella conventa to tolerate them in the free exercise of their religion, but they have often had reason to complain of the violation of their promises. See (History of) Poland.

DISSIMILITUDE, unlikeness or want of similitude. See the article Resemblance and dissimilitude.

DISSIMULATION, in morals, the act of difsembling, by fallacious appearances, or false pretensions.

Good princes regard dissimulation as a necessary virtue; but tyrants consider it as a vice.

It is apparent that secrecy is often necessary, to oppose those who may be willing to circumvent our lawful intentions. But the necessity of precaution would become very rare, were no enterprizes to be formed, but such as could be avowed openly. The francs with which we could then act, would engage people in our interests. Marshal Biron would have saved his life, by dealing ingenuously with Henry IV.

With respect to dissimulation, three things are to be observed; 1. That the characters of those are not to be esteemed, who are referred and cautious without dissimulation. 2. Not to make secrets of unimportant matters. 3. To conduct ourselves in such manner, as to have as few secrets as possible.

DISSIPATION, in physics, an insensible loss or consumption of the minute parts of the body; or that flux whereby they fly off, and are lost.

Circles of Dissipation in optics, is used for that circular space within the retina, which is taken up by one of the extreme pencils or rays issuing from an object.

Dissolution, in general, whatever dissolves or reduces a solid body into such minute parts as to be sustained in a fluid.

The principal dissolvers for metals are aqua-regia and aqua-fortis; for salts, earths, and gums, water; for coral, and other alkaline substances, distilled vinegar or spirits of wine. Dissolvers are the same with what the chemists call menstrua. See the article Menstruum.

Universal
D I S O L V E N T

Universal Dissolvent. See the article Alkaliest.

Dissolution, in physics: a discontinuation, or analysis, of the structure of a mixed body; whereby, what was one, and contiguous, is divided into little parts, either homogeneous or heterogeneous.

Dissolution, then, is a general name for all reductions of concrete bodies into their smallest parts, without any regard to solidity or fluidity: though in the usual acceptance of the word among authors, it is restrained to the reduction of solid bodies into a state of fluidity; which is more properly expressed by evaporation, as a branch of dissolution.

According to the opinion of Fr. Tertius de Lantis, Boerhaave, and some other learned men, the power or faculty of dissolving is lodged in fire alone. See Fire and Heat.

According to this hypothesis, other fluids commonly supposed dissolvents, only produce their effect by means of the fiery specula they abound with; and even air, which is judged a powerful menstruum, owes all its force to the rays of light diffused therein.

Sir Isaac Newton accounts for all dissolution by attraction; and, in effect, the phenomena of dissolution furnish a great part of the arguments and considerations whereby he proves the reality of that principle. The following is a specimen of that great author's way of philosophizing on the subject of dissolution.

"When salt of tartar dissolves by lying in a moist place, is not this done by an attraction between the particles of the salt of tartar and those of the water which float in the air in form of vapours? and why does not common salt, or salt-petre, or vitriol, do the like, but for the want of such an attraction? And when aqua-fortis, or spirit of vitriol, poured on steel-filings, dissolves the filings with a great heat and ebullition; is not this heat and ebullition effected by a violent motion of the parts? and does not that motion argue, that the acid particles of the aqueous liquors rush towards the parts of the metal with violence, and run forcibly into its pores; and the same of aqua-regia for the want of such an attraction, and for the bulk very solid; and therefore exert a very strong attractive force, which electron, or its action, is proportional to the quantity of matter.

Hence it comes to pass that the particles of water are more strongly attracted by the saline particles than they are by one another: the particles of water, therefore, cohering but loosely, and being easily movable, approach the corpuscles of salts, and run, as it were, into their embraces, and the motion of them is quicker or slower, according to their size or greater distances; the attractive force in all bodies being strongest at the point of contact. Therefore, if salt be thrown into the middle of a dish full of water, we shall find the aqueous particles which are in the middle of the dish sharp and pungent to the taste, but the water upon the sides of the vessel almost inapparent; so that, when a motion once arises, the aqueous particles are carried with an equal force towards the salts, and the moment of them is to be estimated from the ratio of their weight and celerity conjointly.

By the force of this impulse, they open to themselves a passage into the pores of the salts, which are very numerous; and at length, so break and divide their texture, that all cohesion of their parts is destroyed: hereupon, being separated, and removed to a convenient distance from one another, they are diffused, and float here and there about the water.

The simple dissolution of saline substances of every kind, in water, may indeed be plausibly enough explained on the hypothesis of attraction; but where the dissolution is attended with heat, the emulsion of vapour, &c., it seems necessary to seek for some other principle than mere attraction to solve these phenomena.

When diluted oil of vitriol, for instance, is poured upon iron-filings, a great quantity of vapour arises, which, if it was attempted to be confined, would certainly break the containing vessel. It is impossible to imagine any connection between attraction and the emulsion of a vapour; and what is still more unaccountable, this vapour is inflammable, though neither the oil of vitriol nor the iron are so by themselves.

Another very strong objection against the hypothesis of attraction may be derived from the phenomena of metallic dissolution in general: for they do not dissolve completely in acids, as salts do in water. By dissolution they are always decomposed, and cannot be recovered in their proper form without a good deal of trouble.

D I S O L V E N T
One metal, indeed, will very often precipitate another from an acid in its metallic form; but this is attended with the decomposition of the second metal; so that this can by no means be reckoned a fair experiment. But, whatever other method is used, the dissolved metal is always recovered in form of an earthy powder, that we could scarcely imagine capable of ever becoming malleable, and assuming the splendid appearance of a metal. Now, if there was a strong attraction between this and the acid, we might very justly conjecture, that the dissolution happened by means of that attraction; but so far from this, after a metal has been dissolved by any acid, and the calx has been separated from it, it is always difficult, and very often impossible, to procure a dissolution of the calx in the same acid. The action of the acid in this case seems not unlike that of fire upon wood or any other inflammable substance. Dry wood, thrown into the fire, burns and flames with great violence; but the flame wood reduced to ashes, instead of burning, extinguishes fire already kindled. In like manner, a piece of clear metal thrown into an acid, dissolves with great violence: but the same metal, deprived of its phlogistic principle, and reduced to a calx, cannot be acted upon by acids, in whatever manner they are applied; at least, not without the greatest difficulty; and the more perfect the calx is, i.e. the more completely it is deprived of its inflammable principle, the greater the difficulty is of combining it afterwards with an acid.

Another thing in which the dissolution of metals by an acid resembles the burning of combustibles by fire, is, that in both cases there is a separation of the principle of inflammability. In the case of oil of vitriol and iron-filings, this is exceedingly obvious; for there the vapour which arises from the mixture takes fire, and explodes with great vehemence. In all other cases it is very easily proved; for the calx is always capable of being revived into metal by the addition of any substance containing phlogiston. The calces prepared by fire, and by precipitation from acids, also resemble one another so much, that in many cases they are scarce to be distinguished.

These considerations seem to favour the hypothesis of Dr Boerhaave; and much more does the following, namely, that almost all metallic solutions produce some degree of fermentable heat. In some metals this is very considerable; but the greatest heat producible by an aqueous solution of any substance is by dissolving quickly in the nitrous acid. The heat here greatly exceeds that of boiling water. In some dissolutions of inflammable matters by a mixture of the vitriolic and nitrous acids, the heat is so great, that the whole mixture takes fire almost instantaneously. Hence the Boerhaavians think they have sufficient grounds to conclude, that fire alone is the agent by which all dissolutions are performed.

These appearances have also been explained on the principles of attraction; and it has been said, that the heat, &c. were owing to nothing but the violent action of the particles of the acid and metal upon each other. But the late discoveries made by Dr Black, with regard to heat, show, that it is capable of remaining concealed in substances for any length of time, and afterwards breaking out in its proper form. It is probable, therefore, that the heat produced in these dissolutions is no other than what existed before, either in the acid or in the metal. But for a full discussion of this subject see the articles Cold, Congelation, Evaporation, Fire, Heat, &c.

Dissolution, in music. See Discord.

Dissyllable, among grammarians, a word consisting only of two syllables: such are nature, science, &c.

Diss, an instrument about which flux is tied in order to be spun.

Distance, in general, an interval between two things, either with regard to time or place. See Metaphysics.

Acceptable Distances, in geometry, are such as may be measured by the chain, &c. See Geometry.

Inacceptable Distances, are such as cannot be measured by the chain, &c. by reason of some river, or the like, &c. which obstructs our passing from one object to another. See Geometry.

Distance, in astronomy. The distance of the sun, planets, and comets, is found only from their parallax, as it cannot be found either by eclipses or their different phases; for from the theory of the motions of the earth and planets we know, at any time, the proportion of the distances of the sun and planets from us; and the horizontal parallaxes are in a reciprocal proportion to these distances. See Astronomy.

Distant properly signifies an aversion or dislike to certain foods; and may be either constitutional, or owing to some disorder of the stomach.

Distemper, among physicians, the same with Disease.

Distemper, in painting, a term used for the working up of colours with something besides water or oil. If the colours are prepared with water, that kind of painting is called limning; and if with oil, it is called painting in oil, and simply painting. If the colours are mixed with size, whites of eggs, or any such proper glutinous or unctuous matter, and not with oil, then they say it is done in distemper.

Distension, in general, signifies the stretching or extending a thing to its full length or breadth.

Distich, a couplet of verses making a complete line. Thus hexameter and pentameter verses are divided into distichs. There are excellent morals in Cato’s distichs.

Distichiasis, in surgery, a disease of the eyelids, when under the ordinary eye-lashes there grows another extraordinary row of hairs, which frequently eradicates the former, and, prickings the membrane of the eye, excites pain, and brings on a defluxion. It is cured by pulling out the second row of hairs with nippers, and cauterizing the pores out of which they issued.

Distillation. See Chemistry, Index.

The objects of distillation, considered as a trade distinct from the other branches of chemistry, are chiefly spirituous liquors, and those waters impregnated with the essential oil of plants, commonly called simple distilled waters. The distilling compound spirits and waters is reckoned a different branch of business, and they who deal in that way are commonly called rectifiers, stillers and This rectifiers.
For distillation, this difference, though it exists among commercial people, is not at all founded in the nature of the thing; compound spirits being made, and simple spirits being rectified, by the very same operations by which they are at first distilled, or at least with very trivial alterations.

The object with every distiller ought to be, to procure a spirit perfectly flavourless, or at least as free from any particular flavour as may be; and in Britain the procuring of such a spirit is no easy matter. The only materials for distillation that have been used in large quantity, are malt and molasses or treacle. Both of these, especially the first, abound with an oily matter, which, rising along with the spirit, communicates a disagreeable flavour to it, and from which it can scarce be freed afterwards by any means whatever.—Some experiments have been made upon carrots, as a subject for the distillers: but these are not as yet sufficiently decisive; nor is it probable, that a spirit drawn from carrots would be at all devoid of flavour, more than one drawn from malt. To dilute the essential oil which gives the disagreeable flavour to malt spirits, it has been proposed to infuse the wort into a rob, or thin extract like a syrup; afterwards to thin it with water, and ferment it in the usual manner. This certainly promises great success; there is no subject we know of that is poise'd of any kind of essential oil, but what will part with it by distillation or by long boiling. The infusilating of the wort, however, does not seem to be either necessary or safe to be attempted; for, in this case, there is great danger of its contracting an empyreuma, which never could be remedied. The quantity lost by evaporation, therefore, might be occasioned, with an equal certainty of dissipating the greater quantity of spirit is obtainable from it; the practice of dissipating the oil before fermentation must certainly be a loss. But we are too little acquainted with the composition of vinous spirits, to have any just foundation for adopting such theories. Besides, it is certain, that the quantity of ardent spirit producible from any substance, malt for instance, very greatly exceeds the quantity of essential oil which can by any means be obtained from the same; nor do we find that these substances, which abound most in essential oil, yield the greatest quantity of spirits. So far from this, fine sugar, which contains little or no essential oil, yields a great deal of ardent spirit.

Previous to the operation of distilling, those of brewing and fermentation are necessary; but as these are fully treated of under the article Brewing, we shall here only observe, that unless the boiling of the wort, before fermentation, is found to dissipate the essential oil, so as to take away the flavour of the malt, there is no necessity for being at the trouble of that operation. The wort may be immediately cooled and fermented. The fermentation ought always to be carried on as slowly as possible, and performed in vessels closely stopped; only having at the bung a valve pressed down by a spring, which will yield with less force than is sufficient to burst the vessel. It should even be suffered to remain till it has become perfectly fine and transparent; as by this means the spirit will not only be superior in quantity, but also in fragrance, pungeancy, and volatility, to that commonly produced.

With regard to performing the operation of distillation, there is only one general rule that can be given, namely, to let the heat, in all cases, be as gentle as possible. Accidents will be effectually prevented by having the worm of a proper wideness, and by rectifying the spirits in a water-bath; which, if sufficiently large, will perform the operation with all the dispatch requisite for the most extensive business.—The vessel in which the rectification is performed, ought to be covered with water up to the neck, and to be loaded with lead at the bottom, so that it may sink in the water. Thus the operation will go on as quickly as if it was on an open fire, and without the least danger of a mischance; nor will it ever be necessary to make the water in the bath come to a boiling heat.

As the object of rectification is to make the spirit clean as well as strong, or to deprive it of the essential oil as well as the aqueous part, it will be proper to have regard to this even in the first distillation. For the purpose, the spirit, as it first comes over, should be received into a quantity of cold water: as by this means the connection betwixt it and the oily matter will be considerably lessened. For the same reason, after it has been once rectified in the water-bath, it should be again mixed with an equal quantity of water, and distilled a second time. Thus the spirit will be freed from most of the oily matter, even though it hath been very much impregnated with it at first. It is necessary to observe, however, that by using such a quantity of water, a considerable part of the water will be left in the residuum of each rectification. All these residuums, therefore, must be mixed together, and distilled on an open fire, with a brisk heat, that the remainder of the spirit may be got out.

After the spirit has been distilled once or twice in this manner from water, it may be distilled in a water-bath without any addition; and this last rectification will free it from most of the water it contains. But if it is required to be highly dephlegmated, a quantity of pure and dry salt of tartar must be added. The attraction betwixt this salt and water is greater than that betwixt water and spirit of wine. The salt therefore imbibes the water contained in the spirit, and sinks with it to the bottom. The spirit, by a single distillation, may then be rendered perfectly free from water, but there is great danger of some of the alkaline salt rising along with it, and impregnating it with what is called an unction flavour. When this once happens, it is impossible to be remedied; and the only way to prevent it is, to make the heat with which the spirit is distilled as gentle as possible. It hath been proposed, indeed, to prevent the rising of any thing alkaline, by the admixture of some calcined vitriol, calcium carbonatis, or other imperfect neutral salt; but this can scarce be supposed to answer any good purpose, as the alkali unites itself with the oily matter of the spirit, and forms a kind of faponaceous compound, which is not so easily affected by the acid of the vitriol as other salt, especially as these salts will not dissolve in the spirit itself.

One
Dissertation on the Production of Brandy in France.

One very great desideratum among the distillers of Britain is, a method of imitating the foreign spirits, particularly brandy, gin, &c., to a tolerable degree of perfection; and notwithstanding the many attempts that are daily made for this purpose, the successes in general have been but very indifferent. On this subject, Mr. Cooper has the following observations, in his Complete System of Distillation; which, as they are applicable to all other spirits as well as brandy, we shall here transcribe.—

The general method of distilling brandies in France need not be formally described, as it differs in nothing from that practiced here in working from malt-waif or molasses: nor are they in the least more cleanly or exact in the operation. They only observe more particularly to throw in a little of the natural ley into the still along with the wine, as finding this gives their spirit the flavour for which it is generally admired abroad. But, though brandy is extracted from wine, experience tells us that there is a great difference in the grapes from which the wine is made. Every soil, every climate, every kind of grapes, varies with regard to the quantity and quality of the spirits extracted from them. There are some grapes which are only fit for eating; others for drying, as tho' of Damascon, Corinth, Provence, and Avignon, but not fit to make wine. Some wines are very proper for distillation, and others much less so. Avignon, and the wines of Languedoc and Provence afford a great deal of brandy by distillation, when the operation is performed on them in their full strength. The Orleans wines, and those of Blois, afford yet more: but the best are those of the territories of Cogniac and Andaye, which are, however, in the number of those the least drunk in France. Whereas those of Burgundy and Champagne, though of a very fine flavour, are improper, because they yield but very little in distillation.

It must also be further observed, that all the wines for distillation, as tho' of Spain, the Canaries, of Alicante, of Cypris, of St. Peres, of Toquet, of Grave, of Hungary, and others of the fame kind, yield very little brandy by distillation; and consequently would cost the distiller considerably more than he could sell it for. What is drawn from them is indeed very good, always retaining the saccharine quality and rich flavour of the wine from whence it is drawn; but as it grows old, this flavour often becomes aromatic, and is not agreeable to all palates.

Hence we see that brandies always differ according as they are extracted from different species of grapes. Nor would there be so great a similarity as there is between the different kinds of French brandies, were the strongest wines used for this purpose: but this is rarely the case; the weakest and lowest flavoured wines only are distilled for their spirit, or such as prove absolutely unfit for any other use.

A large quantity of brandy is distilled in France during the time of the vintage; for all those poor grapes that prove unfit for wine, are usually first gathered, pressed, their juice fermented, and directly distilled. This rids their hands of their poor wines at once, and leaves their caffes empty for the reception of better. It is a general rule with them not to distil wine that will fetch any price as wine; for, in this state, the profits upon them are vastly greater than when reduced to brandies. This large flock of small wines, with which they are almost over-run in France, sufficiently accounts for the making such vast quantities of brandy in that country, more than in others which lie in warmer climates and are much better adapted to the production of grapes. —Nor is it the only fund of their brandies: for all the wine that turns eager, is also condemned to the still; and, in short, all that they can neither export nor consume at home, amounts to a large quantity; since much of the wine laid in for their family provision is so poor as not to keep during the time of spending.

Hence many of our English spirits, with proper management, are convertible into brandies that shall hardly be distinguished from the foreign in many respects, provided the operation be neatly performed.

The common method of rectifying spirits from alkaline salts destroys their vinegar, and in its stead introduces an urinous or luscious taste. But as it is absolutely necessary to restore, or at least to substitute in its room, some degree of vinegar, several methods have been proposed, and a multitude of experiments performed, in order to discover this great desideratum. But none has succeeded equal to the spirit of nitre; and accordingly this spirit, either strong or dulcified, has been used by most distillers to give an agreeable vinegar to their spirits; several difficulties, however, occur in the method of using it, the principal of which is, its being apt to quit the liquor in a short time, and consequently depriving the liquor of that vinegar it was intended to give. In order to remove this difficulty, and prevent the vinegar from quitting the goods, the dulcified spirit of nitre, which is much better than the strong spirit, should be prepared by a previous distillation, continued for some time, with alcohol; the longer the distillation is continued the more intimately will they be blended, and the compound rendered the milder and softer.

After a proper distillation, the dulcified spirit should be mixed with the brandy, by which the vinegar will be intimately blended with the goods, and not disposed to fly off for a very considerable time.—No general rule can be given for the quantity of this mineral acid requisite to be employed; because different proportions of it are necessary in different spirits. It should, however, be carefully attended to, that though a small quantity of it will undoubtedly give an agreeable vinegar resembling that naturally found in the fine subtle spirits drawn from wines, yet an over large dose of it will not only cause a disagreeable flavour, but also render the whole design abortive, by discovering the imposition. Tho' therefore, who endeavours to cover a foul taste in goods by large doses of dulcified spirit of nitre, will find themselves deceived.

But the best and indeed the only method of imitating French brandies to perfection, is by an essentical oil of wine; this being the very thing that gives the French brandies their flavour. It must, however, be remembered, that, in order to use even this ingredient to advantage, a pure tasteless spirit must first be procured; for it is ridiculous to expect that this essentical oil should be able to give the agreeable flavour of French brandies to our fulsome malt spirit, already loaded with its own nauseous oil, or strongly impregnated with a luscious taste from the alkaline salts used
Distillation in rectification. How a pure intrepid spirit may be obtained, has already been considered; it only therefore remains to show the method of procuring this essential oil of wine, which is this:

"Take some cakes of dry wine-lees, such as are used by our hatters, dissolve them in six or eight times their weight of water, distil the liquor with a low fire, and separate the oil in a separating glass; referring for the nicest uses only that which comes over first, the succeeding oil being coarser and more reinous.—Having procured this fine oil of wine, it may be mixed into a quintessence with pure alcohol: by which means it may be preferred a long time fully possessed of all its flavour and virtues; but, without such management, it will soon grow reinous and rancid.

"When a fine essential oil of wine is thus procured, and also a pure and intrepid spirit, French brandies may be imitated to perfection, with regard to the flavour. It must, however, be remembered, and carefully adverted to, that the essential oil be drawn from the same kind of lees as the brandy to be imitated was procured from; we mean, in order to imitate Coniac brandy, it will be necessary to distil the essential oil from Coniac lees; and the same for any other kind of brandy. For, as different brandies have different flavours, and as the same for any other kind of brandy. For, as different brandies have different flavours, and as different brandies have different flavours, and as these flavours are entirely owing to the essential oil of the grape, it would be preposterous to endeavour to imitate the flavour of Coniac brandy with an essential oil procured from the lees of Bourdeaux wine.—When the flavour of the brandy is well imitated by a proper dosage of the essential oil, and the whole reduced into one simple and homogeneous fluid, other difficulties are still behind: The flavour, though the essential part, is not, however, the only one; the colour, the proof, and the softness, must also be regarded, before a spirit that perfectly resembles brandy can be procured. With regard to the proof, it may be easily hit, by using a spirit rectified above proof; which after being intimately mixed with the essential oil of wine, may be let down to a proper standard with fair water. And the softness may, in a great measure, be obtained by distilling and rectifying the spirit with a gentle fire; and what is wanting of this criterion in the liquor when first made, will be supplied by time; for it must be remembered, that it is a time element that gives this property to French brandies: they being at first acid, foul, and fiery. But, with regard to the colour, a particular method is required to imitate it to perfection.

"The art of colouring spirits owes its rise to observations on foreign brands. A pipe of French brandy that has acquired by age a great degree of softness and ripeness, is observed at the same time to have acquired a yellowish brown colour; and hence our distillers have endeavoured to imitate this colour in such spirits as are intended to pass for French brandy. And in order to this, a great variety of experiments have been made on different substances. But in order to know a direct and sure method of imitating this colour to perfection, it is necessary we should be informed whence the French brandies themselves acquire their colour. This discovery is very easily made. The common experiment of trying whether brandy would turn blackish with a solution of iron, shows that the colour is owing to some of the reinous matter of the oak-cask dissolved in the spirit. There can be no difficulty, therefore, in

imitating this colour to perfection. A small quantity of the extract of oak, or the shavings of that wood, properly digested, will furnish us with a tincture capable of giving the spirit any degree of colour required. But it must be remembered, that as the tincture is extracted from the cask by brandy, that is, alcohol and water, it is necessary to use both in extracting the tincture; for each of these dissolves different parts of the wood. Let, therefore, a sufficient quantity of oak shavings be digested in strong spirit of wine, and also at the same time other oak-shavings be digested in water; and when the liquors have acquired a strong tincture from the oak, let both be poured off from the shavings into different vessels, and both placed over a gentle fire till reduced to the consistence of treacle. In this condition let the two extracts be intimately mixed together; which may be effectually done by adding a small quantity of loaf-sugar, in fine powder, and rubbing the whole well together. By this means a liquid essential extract of oak will be procured, and always ready to be used as occasion shall require.

"There are other methods in use for colouring brandies; but the best, besides the extract of oak above-mentioned, are treacle and burnt sugar. The treacle gives the spirit a fine colour, nearly resembling that of French brandy; but as its colour is dilute, a large quantity must be used: this is not, however, attended with any bad consequences; for notwithstanding the spirit is really weakened by this addition, yet the bubble proof, the general criterion of spirits, is greatly mended by the tenacity imparted to the liquor by the treacle. The spirit also acquires from the mixture a sweetish or luscious taste, and a fullness in the mouth; both which properties render it very agreeable to the palates of the common people, who are in fact the principal consumers of these spirits. A much smaller quantity of burnt sugar than of treacle will be sufficient for colouring the same quantity of spirits: the taste is also very different; for instead of the sweetness imparted by the treacle, the spirit acquires from the burnt sugar an agreeable bitterness, and by that means recommends itself to nicer palates, which are offended by a luscious spirit. The burnt sugar is prepared by dissolving a proper quantity of sugar in a little water, and then burning it over the fire till it acquires a black colour. Either treacle or burnt sugar will nearly imitate the genuine colour of old French brandy; but neither of them will succeed when put to the test of the vitriolic solution.

"The spirit distilled from molasses or treacle is very clean or pure. It is made from common treacle dissolved in water, and fermented in the same manner as the wassail for the common malt spirit. But if some particular art is not used in distilling this spirit, it will not prove so vinous as the malt spirit, but more flat and less pungent and acrid, though otherwise much cleaner taisted, as its essential oil is of much less offensive flavour. Therefore, if good fresh wine lees, abounding in tartar, be added and duly fermented with the molasses, the spirit will acquire a much sweeter vinosity and briskness, and approach much nearer to the nature of foreign spirits. Where the molasses spirit is brought to the common proof-strength, if it is found not to have a sufficient vinosity, it will be very proper to add some good dulced spirit of nitre; and if the spirit be clean worked,
Distillation worked, it may, by this addition only, be made to pass on ordinary judges for French brandy. Great quantities of this spirit are used in adulterating foreign brandy, rum, and arrack. Much of it is also used alone in making cherry-brandy and other drugs by infusion; in all which many, and perhaps with justice, prefer it to foreign brandies. Molasses, like all other spirits, is entirely colourless when first extracted; but distillers always give it as nearly as possible the colour of foreign spirits.

If these principles hold good, the imitation of foreign spirits of all kinds must be an easy matter. It will only cost the procuring of some of those substances from which the spirit is drawn: and distilling this with water, the essential oil will always give the flavour desired. Thus, to imitate Jamaica rum, it will only be necessary to procure some of the tops, or other useless parts, of the sugar-canes; from which an essential oil being drawn, and mixed with clean molasses spirit, will give it the true flavour. The principal difficulty must lie in procuring a spirit totally, or nearly, free of all flavour of its own. The spirit drawn from the refuse of a sugar-house is by our author condemned as superior to that drawn from molasses: though even this is not entirely devoid of some kind of flavour of its own; nor indeed is the spirit drawn from the best refined sugar entirely flavourless. It is very probable, therefore, that to procure an absolutely flavourless spirit is impossible. The only method, therefore, of imitating foreign spirits is, by choosing such materials as will yield a spirit flavoured as much like them as possible. The materials most recommended by our author in this case, and probably the best that can be used, are raisins. Concerning these he gives the following directions: "In order to extract this spirit, the raisins must be infused in a proper quantity of water, and fermented in the manner already directed. When the fermentation is completed, the whole is to be thrown into the still, and the spirit extracted by a strong fire. The reason why we here direct a strong fire is, because by that means a greater quantity of the essential oil will come over the head with the spirit, which will render it fitter for the distiller's purpose: for this spirit is commonly used to mix with common malt goods: and it is surprising how far it will go in this respect, ten gallons of it being often sufficient to give a determining flavour and agreeable vinosity to a whole piece of malt spirits. It is therefore well worth the distiller's while to endeavour at improving the common method of extracting spirits from raisins, and perhaps the following hints may merit attention. When the fermentation is completed, and the still charged with fermented liquor as above directed, let the whole be drawn off with as brisk a fire as possible; but, instead of the cask or can generally used by distillers for receiver, let a large glass, called by chemists a separating glass, be placed under the noze of the worm, and a common receiver applied to the spout of the separating glass: by this means the essential oil will swim upon the top of the spirit, or rather low wine, in the separating glass, and may be easily preferred at the end of the operation. The use of this limpid essential oil is well known to distillers; for in this resides the whole flavour, and consequently may be used to the greatest advantage in giving that distinguished taste and true vinosity to the common malt spirits. After the oil is separated from the low-wine, the liquor may be rectified in balneiaries into a pure and almost tasteless spirit, and therefore well adapted to make the finest compound cordials, or to imitate or mix with the finest French brandies, arracks, &c. In the same manner a spirit may be obtained from cyder. But as its particular flavour is not so desirable as that obtained from raisins, it should be distilled in a more gentle manner, and carefully rectified according to the directions we have already given."

These directions may suffice for the distillation of any kind of simple spirits. The distillation of compound ones depends on the observation of the following general rules, which are very easy to be learned and practised.

1. The artist must always be careful to use a well cleansed spirit, or one freed from its own essential oil. For, as a compound water is nothing more than a spirit impregnated with the essential oil of the ingredients, it is necessary that the spirit should have deposited its own.

2. Let the time of previous digestion be proportioned to the tenacity of the ingredients, or the ponderosity of their oil.

3. Let the strength of the fire also be proportioned to the ponderosity of the oil intended to be raised with the spirit.

4. Let only a due proportion of the finest parts of the essential oil be united with the spirit; the grocer and less fragrant parts of the oil not giving the spirit so agreeable a flavour, and at the same time rendering it unwholesome. Thus may in a great measure be effected by leaving out the fains, and making up to proof with fine soft water in their stead.

A careful observation of these four rules will render this part of distillation much more perfect than it is at present. Nor will there be any occasion for the use of burnt alum, white of eggs, lignum, &c. to fine down cordial waters; for they will presently be fine, sweet, and pleasant tasted, without any further trouble. We shall now subjoin particular receipts for making some of those compound waters, or spirits, that are most commonly to be met with, and are in the most general estimation.

**Strong Cinnamon-water.** Take eight pounds of fine cinnamon bruited, 17 gallons of clean rectified spirit, four or two gallons of water. Put them into your still, and digest them 24 hours with a gentle heat; after which draw off 16 gallons with a very strong heat. A cheaper spirit, but of an inferior quality, may be obtained by using cassia lignea instead of cinnamon. If you would dulcify your cinnamon water, take double-refined sugar in what quantity you please; the general proportion is about two pounds to a gallon; and dissolve it in the spirit, after you have made it up proof with clean water. One general caution is here necessary to be added; namely, that near the end of the operation, you carefully watch the spirits as they runs into the receiver, in order to prevent the fains from mixing with the goods. This you may discover by often catching some of it as it runs from the worm in a glass and observing whether it is fine and transparent; for as soon as ever the fains begin to rise, the spirit will have an azure or bluish cast. As soon as this alteration
of each three ounces and a half; marigold flowers, one pound; caraway-seeds, ten ounces; proof-spirit, ten gallons; water, three gallons. Distil with a pretty strong fire, till the fains begin to rise. Then take of liquorice-root sliced, half a pound; raisins stove, two pounds; red saunders, half a pound; digest these three days in two quarts of water; then strain out the clear liquor, in which dissolve three pounds of fine sugar, and mix it with the spirit drawn by distillation.

*Ufquebaugh.* Take nutmegs, cloves, and cinnamon, of each two ounces; the seeds of anise, caraway, and coriander, of each four ounces; of liquorice-root sliced, half a pound. Bruise the seeds and spices; and put them, together with the liquorice, into the still with 11 gallons of proof-spirits, and two gallons of water. Distil with a pretty brisk fire till the fains begin to rise. But, as soon as the still begins to work, fasten to the nofe of the worm two ounces of English saffron tied up in a cloth, that the liquor may run through it, and extract all its tincture; and in order to this, you should frequently prefs the saffron with your fingers. When the operation is finished, dulcify your goods with fine sugar.

*Ratafia.* A liquor prepared from different kinds of fruits, and is of different colours according to the fruits made use of. Of red ratafia there are three kinds, the fine, the dry or sharp, and the common. The fruits most proper for making red ratafia, are the black heart-cherries, the common red cherry, the black cherry, the mery or honey-cherry, the strawberry, the raspberry, the red gooseberry, and the mulberry. These fruits should be gathered when in their greatest perfection, and the largest and most beautiful of them chosen for the purpose. The following is a receipt for making red ratafia, fine and soft. Take of the black heart-cherries 24 pounds; black cherries, four pounds; raspberries and strawberries, of each three pounds. Pick the fruits from their stalks, and bruise them; in which state let them continue 12 hours; press out the juice; and to every pint of it add a quarter of a pound of fugar. When the fugar is dissolved, run the whole through thefiltering bag, and add to it three quarts of clean proof-spirits. Then take of cinnamon, four ounces; of mace, one ounce; and of cloves, two drams. Bruise these spices; put them into an alembic with a gallon of clean proof-spirits and two quarts of water, and draw off a gallon with a brisk fire. Add as much of this spicy spirit to your ratafia as will render it agreeable to your palate; about one-fourth is the usual proportion.

Ratafia made accordingly to the above receipt will be of a very rich flavour and elegant colour. It may be rendered more or less of a spicy flavour, by adding or diminishing the quantity of spirit distilled from the spices. Some, in making ratafia, suffer the expressed juices of their fruits to ferment several days: by this means the vinosity of the ratafia is increased; but, at the same time, the elegant flavour of the fruits is greatly diminished. Therefore, if the ratafia is desired stronger or more vinous, it may be done by adding more spirits to the expressed juice; by which means the flavour of the fruits may be preferred, as well as the ratafia rendered stronger. It is also a method with some to tie the spices in a linen bag, and suspend them in the ratafia.
Dry or Sharp Ratafia. Take cherries and gooseberries, of each 30 pounds; mulberries, seven pounds; raspberries, ten pounds. Pick all these fruits clean from their stalks, &c. bruise them, and let them stand 12 hours; but do not suffer them to ferment. Press out the juice, and to every point add three ounces of sugar. When the sugar is dissolved, run it through the filtering bag, and to every five pints of liquor add four pints of clean-proof spirit; together with the same proportion of spirit drawn from the plices in the foregoing composition.

Common Ratafia. Take of nutmegs, eight ounces; bitter almonds, ten pounds; Lisbon sugar, eight pounds; ambergrease, ten grains; infuse these ingredients three days in ten gallons of clean-proof spirit, and filter through a flannel bag for use. The nutmegs and bitter almonds must be bruised, and the ambergrease rubbed with the Lisbon sugar in a marble mortar, before they are infused in the spirit.

Gold Cordial. Take of the roots of angelica, four pounds; raisins flowered, two pounds; coriander seeds, half a pound; caraway seeds and cinnamon, of each half a pound: cloves, two ounces; figs and liquorice-root, of each one pound; proof-spirit, eleven gallons; water, two gallons. The angelica, liquorice, and figs, must be sliced before they are added. Digest two days; and draw off by a gentle heat till the fats begin to rise; hanging in a piece of linen, fastened to the mouth of the worm, an ounce of English taffan. Then distil eight pounds of sugar in three quarts of rofe-water, and add to it the distilled liquor,—This liquor derives its name of Gold Cordial, from a quantity of leaf-gold being formerly added to it; but this is now generally diluted, as it cannot possibly add any virtue.

Cardamum, or All-fours. Take of pimento, caraway, and coriander seeds, and lemon-peel, each three pounds; of malt spirits, eleven gallons; water, three gallons. Draw off with a gentle fire, dilute with common sugar, and make up to the strength desired with clear water.—This is a dram greatly used by the poorer fort of people in some countries.

Geneva. There was formerly sold in the apothecaries shops a distilled spirituous water of juniper; but the vulgar being fond of it as a dram, the distillers supplant the apothecaries, and fold it under the name of Geneva. The common kind, however, is not made from juniper-berries, but from oil of turpentine; and indeed it is surprising, that people should accustom themselves to drink such liquors for pleasure.—The receipt for making this kind of spirit, sold in the gin-shops at London, is as follows. Take of the ordinary malt spirits, ten gallons; oil of turpentine, two ounces; bay-fall, three handfuls. Draw off by a gentle fire till the fats begin to rise; and make up your goods to the strength required with clear water.

The best kind is made by the following receipt.—Take of juniper-berries, three pounds; proof-spirit, ten gallons; water, four gallons: Draw off by a gentle fire till the fats begin to rise, and make up your goods to the strength required with clean water.

There is a sort of this liquor called Hollands Geneva, from its being imported from Holland, which is greatly esteemed.—The ingredients used by the Dutch are the same with those given in the last recipe; only instead of malt-spirits, they use French brandy. But from what has been already observed concerning the nature of these kind of spirits, it is easy to see, that by the help of a well rectified spirit, geneva may be made in Britain at least nearly equal to the Dutch, provided it is kept to a proper age; for all spirituous liquors contract a softness and mellowness by age, impossible to be imitated any other way.

DISTILLERY, the art of distilling brandy and other spirits. This art was first brought into Europe by the Moores of Spain, about the year 1120; they learned it of the African Moors, who had it from the Egyptians: and the Egyptians are said to have practised it in the reign of the emperor Dioclesian, though it was unknown to the ancient Greeks and Romans. See Distillation, and Fermentation.

DISTINCTION, in logic, is an assemblage of two or more words, whereby disparate things, or their conceptions, are denoted.

DISTORTION, in medicine, is when any part of the human body remarkably deviates from its natural shape or position. Distortions of different parts may arise either from convulsion or palsy; though sometimes a terrible distortion in the shape of the whole body hath arisen merely from carelessness and ill habits. Mr Winflow, in the memoirs of the Academy of Sciences at Paris, gives a very remarkable account of a lady of quality, whom he had known to be perfectly straight for several years; but who taking afterwards to a sedentary course of life, got a custom of dressing herself very carelessly, and of leaning as the fat, either forwards or to a side. It was not many months before she found it painful and troublesome to stand or sit upright; and soon afterwards she found an inequality in the lower part of the back-bone. Alarm'd at this, she consulted the gentleman who gave the account. To prevent the increase of the malady, he ordered her to wear a particular sort of jumps instead of stays, and had a pad of a proper size applied; but this was soon neglected, and the consequence was, that in a little time the back-bone became more and more crooked, and at length bent itself sidewise in two contrary directions, so as to represent the figure of the Roman S; and the lady, still refusing to take the proper measures, lost a fourth part of her height; and continued for the remainder of her life, not only crooked from right to left and from left to right, but so oddly folded together, that the first of the false ribs on one side approached very near the creft of the os ilium on that side, and the viscera of the lower belly became strangely pushed out of their regular places to the opposite side; and the stomach itself was so strongly compressed, that whatever she swallowed seemed to her to fall into two separate cavities.

DISTRESS, in its ordinary acceptation, denotes calamity, misery, or painful suffering.

The contemplation of Distress, a source of pleasure. On this subject we have a very pleasing and ingenious essay by Dr Barnes, in the Memoirs of the Literary
D I S

and Philosophical Society of Manchester. It is introduced with the following motto:

Suors mari magno, turbulentis aqua veniti; E terrâ alterius quamvis pestis praelium. Non quia vanni quamquam si juris adoptatis; Sed quibus vita malis versus, quae nonem sumpsit.

LUCRETII.

"The pleasure here described by the poet, and of which he has mentioned so striking and apposite an instance, may perhaps at first seem to be singular and astonishing a nature, that some may be disposed to doubt of its existence. But that it does exist, in the case here referred to, and in many others of a similar kind, is an undoubted fact; and it may not appear an useless or disagreeable entertainment, to trace its source in the human breast, together with the final cause for which it was implanted there by our benevolent Creator.

"Shall I, it may be said, feel complacency in beholding a scene in which many of my fellow creatures are agonizing with terror, whilst I can neither diminish their danger, nor, by my sympathy, divide their anguish? Am I the less in the light of another, does not my bosom naturally feel pain? Do I not share in his sensations? And is not this strong and exquisite sensibility intended by my Maker to urge me on to active and immediate assistance? These sensations are indeed attended with a noble pleasure, when I can, by friendly attention, or by benevolent communication, soothe the sorrow of the poor mourner, snatch him from danger, and thus prove the reality of the feeling, the sympathetic feelings will of themselves, at once, and previously to all reflection, become a source of agreeable and tender emotions. They will thus dignify and enhance the satisfaction, if any such be felt, arising merely from the consideration of our own personal fortune. And the more entirely we enter into the scene, by losing all ideas of its being either past or fabulous, the more perfectly we forget ourselves, and are absorbed in the feeling—the more exquisite is the sensation.

But as our subsequent speculations will chiefly turn upon the pleasure derived from real scenes of calamity, and not from those which are imaginary, it may be expected that we produce instances in proof that such pleasure is felt by persons very different in their taste and mental cultivation.

We shall not mention the horrid joy with which the savage feasts his eye upon the agonies and contortions of his expiring prisoner—expiring in all the pains which artificial cruelty can inflict! Nor will we recur to the almost equally savage fons of ancient Rome, when the majesty of the Roman people could rush, with eagerness and transport, to behold hundreds of gladiators contending in fatal conflict, and probably more than half the number extended, wretching in blood and writhing in agony, upon the plain. Nor will we mention the Spanish bull-feasts; nor the fervent acclamations of an English mob around their fellow creatures, when engaged in furious battle, in which it is possible that some of the combatants may receive a mortal blow, and be hurried in this awful state to the bar of his Judge. Let us survey the multitudes which, in every part of the kingdom, always attend an execution. It may perhaps be said, that is all places the vulgar have little of the sensibility and tenderness of more polished bosoms. But, in the last mentioned instance, an execution, there is no exultation in the sufferings of the poor criminal. He is regarded by every eye with the most melting compassion. The whole assembly sympathizes with him in his unhappy situation. An awful stillness prevails at the dreadful moment. Many are wrung with unutterable sensations; and prayer and silence declare, more loudly than any language could, the interest they feel in his diftresses. Should a reprieve come to relieve him from death, how great is the general triumph and congratulation! And probably in this multitude you will find not the mere vulgar herd alone, but the man of superior knowledge and more refined sensibility;
To mitigate the sharp, with gracious drops
Of cordial Pleasure. Ask the faithful youth,
Why the cold urn of her, whom long he loved,
So often fills his arm? So often draws
His lonely footsteps, at the silent hour,
To pay the mournful tribute of his tears?
O! he will tell thee, that the wealth of worlds
Should ne’er reduce his bosom to forego
That sacred show, when stealing from the noise
Of care and envy, sweet remembrance floats,
With Virtue’s kindred looks, his aching breast,
And turns his tears to rapture—Ask the crowd,
Which flies impatient from the village-walk
To climb the neighbouring cliffs, when far below
The cruel winds have hurled upon the coast
Some helpless bark: whose sacred Pity
The general eye, or Terror’s icy hand
Smiles their distorted limbs, or horrid hair,
While ever mother clings to her breast
Catches her child; and, pointing where the waves
Foam through the shattered vessel, shrieks aloud,
As one poor wretch, that spreads his piteous arms
For succour, swallowed by the roaring surge,
As now another, dashed against the rock,
Drops lifeless down. O deemest thou indeed
No kind endearment here, by nature given,
To mutual terror, and compassion’s tears?
Or sweetly melting lotus, which attracts
O’er all that edge of pain, the social powers,
To this their proper action, and their end?

The poet pursues the sentiment in the same animated
Imagery, describing the strong, but pleasurable, sen-
Sations which the soul feels, in reading the sufferings
Of heroes who nobly died in the cause of liberty
And their country:

When the pious band
Of youths, who fought for freedom, and their fires,
Lie side by side in perfect
And wherefore should the clamorous
Of pallor, swelling with distressing
And the cruel winds have hurled upon the coast
Some helpless bark: whose sacred Pity
The general eye, or Terror’s icy hand
Smiles their distorted limbs, or horrid hair,
While ever mother clings to her breast
Catches her child; and, pointing where the waves
Foam through the shattered vessel, shrieks aloud,
As one poor wretch, that spreads his piteous arms
For succour, swallowed by the roaring surge,
As now another, dashed against the rock,
Drops lifeless down. O deemest thou indeed
No kind endearment here, by nature given,
To mutual terror, and compassion’s tears?
Or sweetly melting lotus, which attracts
O’er all that edge of pain, the social powers,
To this their proper action, and their end?

The poet pursues the sentiment in the same animated
Imagery, describing the strong, but pleasurable, sen-
Sations which the soul feels, in reading the sufferings
Of heroes who nobly died in the cause of liberty
And their country:

When the pious band
Of youths, who fought for freedom, and their fires,
Lie side by side in perfect
And wherefore should the clamorous
Of pallor, swelling with distressing
And the cruel winds have hurled upon the coast
Some helpless bark: whose sacred Pity
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DIS

have a still larger proportion. Let us attempt to trace some of the rest.

There are few principles in human nature of more general and important influence than that of sympathy. A late ingenious writer, led by the fashionable idea of simplifying all the springs of human nature into one source, has, in his beautiful Theory of Moral Sentiments, endeavored to analyze a very large number of the feelings of the heart into sympathetic vibration. Though it appears to us most probable, that the human mind, like the human body, possesses various and distinct springs of action and of happiness, yet he is shown, in an amazing diversity of instances, the operation and importance of this principle of human nature. Let us apply it to our present subject.

We naturally sympathize with the passions of others. But if the passions they appear to feel be not those of mere distresses alone; if, midst the scenes of calamity, they display fortitude, generosity, and forgiveness; if, "rising superior to the cloud of ills which covers them," they nobly stand firm, collected, and patient, the higher source of pleasure opens upon us, from complacency, admiration, and that unutterable sympathy which the heart feels with virtuous and heroic minds. By the operation of this principle, we place ourselves in their situation; we feel, as it were, some share of that conscious integrity and peace which they must enjoy. Hence, as before observed, the pleasure will vary, both as to its nature and degree, according to the scene and characters before us. The shock of contending armies in the field,—the ocean wrought to tempeff, and covered with the wreck of scattered vessels,—and a worthy family flently, yet nobly, bearing up against a multitude of surrounding foreshores, will excite very different emotions, because the component parts of the pleasurable sensation consist of very different materials. They all excite admiration; but admiration, how diversified, both as to its degree and its cause! These several ingredients may doubtless be so blended together, that the pleasure shall make but a very small part of the mixed sensation. The more agreeable tints may bear little proportion to the terrifying red or the gloomy black.

In many of the instances which have been mentioned, the pleasure must arise chiefly, if not solely, from the circumstances or accomplishments of the scene. The sublime feelings excited by the view of an agitated ocean, relieve and soften those occasioned by the shipwreck. And the awe excited by the presence of thousands of men, acting as with one soul, and displaying magnanimity and firmness in the most solemn trial, tempers those sensations of horror and of pain which would arise from the field of battle.

The gratification we are attempting to account for depends also, in a very considerable degree, upon a principle of human nature, implanted in it for the wifefit ends; the exercise which it gives to the mind, by routuig it to energy and feeling. Nothing is so insupportable, as that languor and ennui, for the full expression of which our language does not afford a term. How agreeable it is, to have the soul called forth to exertion and sensibility, let the gameseter witnesses, who, unable to endure the latitude and flame of unanimated luxury, runs with eagerness to the place where probably await him all the irritation and agony of tumultuous passions.

Again; it is a law of our nature, that opposite passions, when felt in succession, and, above all, when felt at the same moment, heighten and increase each other. Safe succeeding pain, certainty after suspense, friendship after aversion, are unspeakably stronger than if they had not been thus contrasted. In this conflict of feelings, the mind rises from passive to active energy. It is routed to intense sensation; and it enjoys that peculiar, exquisite, and complex feeling, in which, as in many articles of our table, the acid and the sweet, the pleasurable and painful, pungencies are so happily mixed together, as to render the united sensation amazingly more strong and delightful.

We have not yet mentioned the principle of curiosity, that busy and active power, which appears so early, continues almost unimpaired so long, and to which, for the wifest ends, is annexed so great a repit of enjoyment. To this principle, rather than to a love of cruelty, would we ascribe that pleasure which children sometimes seem to feel from torturing flies and leifer animals. They have not yet formed an idea of the pain they inflict. It is, indeed, of unspeakable consequence, that this practice be checked as soon and as effectually as possible, because it is so important, that they learn to connect the ideas of pleasure and pain with the motions and actions of the animal creation. And to this principle we may also refer no small share of that pleasure in the contemplation of distressful scenes, the springs of which, in the human heart, we are now endeavouring to open.

To curiosity, then,—to sympathy,—to mental exercise,—to the idea of our own security,—and to the strong feelings occasioned by viewing the actions and passions of mankind in interesting situations, do we ascribe that gratification which the mind feels from the survey of many scenes of sorrow. We have called it a pleasure; but it will approach towards, or recede from, pleasure, according to the nature and proportion of the ingredients of which the sensation is composed. In some cafes, pain will predominate. In others, there will be exquisite enjoyment.

The final cause of this constitution of the human mind is probably, that by means of this strong sensation, the soul may be preserved in continual and vigorous motion—that its feelings may be kept lively and tender—that it may learn to practice the virtues it admires—and to asit those to whom its sympathy can reach—and that it may thus be led, by these social exercises of the heart, to soften with compassion—to expand with benevolence—and generously to asit in every cafe, in which assistance can be given. An end this sufficient,

"To assert eternal Providence,
And justify the ways of God to man."

DISTRESS, in law, the seizing or distracting any thing for rent in arrear, or other duty unperformed.

The effect of this distress is to compel the party either to replevy the things distrained, or contest the taking, in an action of trespass against the distrainer; or rather to oblige him to compound and pay the debt or duty for which he was so distrained.

There are likewise compulsory distresses in actions,
to cause a person appear in court; of which kind there is a diftrress personal of one's moveable goods, and the profits of his lands, for contempt in not appearing after summons; there is likewise diftrress real, of a person's immovable goods. In these cases none shall be distrained to answer for any thing touching their free-holds, but by the king's writ.

Diftrress may be either finite or infinite. Finite diftrress is that which is limited by law, in regard to the number of times it shall be made, in order to bring the party to a trial of the action. Infinite diftrress is that which is without any limitation, being made till the person appears; it is farther applied to jurors that do diftrress; of these the former extends to all the goods, chattels, or services; and where a rent is reserved on a perfon, of common right, may diftrain for rents and all gifts ill tail, lease for life, or years, &c. though there is a clause of diftrress in the deed.

DISTRIBUTION, in a general sense, the act of dividing a thing into several parts, in order to the disposing each in its proper place.

DISTRIBUTION, in architecture, the dividing and disposing the several parts and pieces which compose a building, as the plan directs. See Architecture.

DISTRIBUTION, in rhetoric, a kind of description, whereby an orderly division and enumeration is made of the principal qualities of the subject. David supplies us with an example of this kind, when, in the heat of his indignation against sinners, he gives a description of their iniquity; "Their throat is an open sepulchre; they flatter with their tongues; the poison of asp is under their lips; their mouth is full of cursing and lies; and their feet are swift to shed blood."  

DISTRIBUTION, in printing, the taking a form orander, separating the letters, and disposing them in the cafes again, each in its proper cell. See PRINTING.

DISTRICT, in geography, a part of a province, distinguished by peculiar magistrates, or certain privileges, in which it is synonymous with hundred. See HUNDRED.

DISTRINGAS JURATORES, a writ directed to the sheriff, or other officer, that he distrain a person for debt to the king, &c. for his appearance at a certain day.

DISTRINGAS JURATORES, a writ directed to the sheriff, whereby he is commanded to distrain upon a jury to appear, and to return particulars on their lands, &c. for non-appearance. This writ of distringas juratones inures in behalf of the sheriff to have their bodies in court, &c. at the return of the writ.

DITCH, a common fence or inclosure in marshes, or other wet land where there are no hedges. They allow these ditches fix feet wide against highways that are broad; and against commons, five feet. But the common ditches about inclusions, dug at the bottom of the bank on which the quick is raised, are three feet wide at the top, one at the bottom, and two feet deep. By this means each side has a slope, which is of great advantage; for where this is neglected, and the ditches dug perpendicular, the sides are always washing down, besides, in a narrow bottomed ditch, if cattle get down into it, they cannot stand to turn themselves to crop the quick; but where the ditch is four feet wide, it should be two and a half deep; and where it is five wide, it should be three deep; and so in proportion.

DITCH-WATER is often used as an object for the microscope, and seldom fails to afford a great variety of animalcules. This water very often appears of a yellowish, greenish, or reddish colour; and this is wholly owing to the multitudes of animals of those colours which inhabit it. These animals are usually of the shrimp kind: and Swammerdam, who very accurately examined them, has called them, from the figure of their horns, pulex aquaticus barbifrons. They copulate in May or June; and are often so numerous at that season, that the whole body of the water they are found in, is seen to be of a red, green, or yellowish-colour, according to the colours of their bodies. The green thin scum also, so frequently seen on the surface of standing waters in summer, is no other than a multitude of small animalcules of this or some of the other kinds. Dunghill water is not less full of animals than that of ditches; and is often found so fraught with animalcules, that it seems altogether alive: it is then so very much crowded with these creatures, that it must be diluted with clear water before they can be distinctly viewed. There are usually in this fluid a fort of cels, which are extremely active; and besides the and many other of the common inhabitants of fluids, there is one species found in this which seems peculiar to it: the middle part of them is dark and beset with hairs, but the ends are transparent; their tails are tapering, with a long spire at the extremity, and their motion is slow and waddling. See Animalcule.

DITCH, in fortification, called also fos and moat, a trench dug round the rampart or wall of a fortified place, between the scarp and counter-scarp. See Fortification.

DITHYRAMBUS, in ancient poetry, a hymn in honour of Bacchus, full of transport and poetical rage. This poetry owes its birth to Greece, and to the transports of wine; and yet art is not quite exploded, but delicately applied to guide and restrain the dithyrambic impetuosity, which is indulged only in pleasing flights. Horace and Aristotle tell us, that the ancients gave the name of dithyrambus to those verses wherein none of the common rules or measures were observed. As we have now no remains of the dithyrambus of the ancients, we cannot say exactly what their measure was.

DITONE, in music, an interval comprehending two tones. The proportion of the sounds that form the ditone is 4: 5, and that of the semiditone is 5: 6.

DITRIHEDRIA, in mineralogy, a genus of spars with twice three sides, or six planes; being formed of two trigonal pyramids joined to base base, without any intermediate column. See Spar.

The species of dithriedria are distinguished by the different figures of their pyramids.

DITTANDER, in botany. See Lepidium.

DITTO, in books of accounts, usually written D增, signifies the aforementioned. The word is corrupted from
DIV

from the Italian detto, "the said," as in our law-
phrase, "the said premises," meaning the same as
were aforementioned.

DIVALIA, in antiquity, a feast held among the
ancient Romans, on the 21st day of December, in ho-
nour of the goddes Angeronia: whence it is also call-
ed Angeronatia.—On the day of this feast, the ponti-
cies performed sacrifice in the temple of Voluptia, or
the goddes of joy and pleasure; who, some say, was
the same with Angeronia, and supposed to drive away
all the forrows and chagrin of life.

DIVAN, a council-chamber or court of justice a-
mong the eastern nations, particularly the Turks.—
The word is Arabic, and signifies the same with SOFA
in the Turkish dialect.

There are two sorts of divans; that of the grand
signior, called the council of state, which consists of seven
of the principal officers of the empire; and that of the
grand vizir, composed of six other vizirs or counsellors
of state, the chancellor, and secretaries of state, for the
distribution of justice.

The word is also used for a hall in the private houses
of the orientals. The custom of China does not allow
the receiving of visits in the inner parts of the house,
but only at the entry, in a divan contrived on purpose
for ceremonies.

Travellers relate wonders of the silence and expedi-
tion of the divans of the East.

DIVAN-BEGHI, the superintendant of justice in Per-
fia, whose place is the last of the six ministers of the second
rank, who are all under the athenmaduler or first min-
ister. To this tribunal of the divan-beghi he appeals
from complaints passed by the governors. He has a
fixed stipend of 50,000 crowns for administering jus-
tice. All the ferjeants, uhlans, &c. of the court are in
his service. He takes cognizance of the criminal cau-
ses of the chams, governors, and other great lords of Per-
fia, when accused of any fault. There are divan-beghis
not only at court and in the capital, but also in the pro-
vincies and other cities of the empire. The alcoran is
the sole rule of his administration of justice, which also
he interprets at pleasure. He takes no cognizance of
civil cases: but all differences arising between the offi-
cers of the king's household and between foreign min-
nisters are determined by him.

DIVANDUROW, the name of seven islands which
lie a league north of the Maldives, and 24 from the
coast of Malabar, almost opposite to Cananor.

DIVER, in ornithology. See CYLINDRUS.

DIVERGENT, or DIVERGING, LINES, in geometry,
are those which constantly recede from each other.

DIVERGENT RAYS, in optics, are those which, going
from a point of the visible object, are dispersed, and
continually depart one from another, in proportion as
they are removed from the object: in which sense it is
opposed to CONVERGENT. See OPTICS.

DIVERSIFYING, in rhetoric, is of infinite ser-
vices to the orator: it is an accomplishment essential
to his character, and may fitly be called the subject of all
his tropes and figures. Voelius lays down six ways of
diversifying a subject. 1. By enlarging on what was
briefly mentioned before. 2. By a concise enumera-
tion of what had been insisted on at length. 3. By
adding something new to what is repeated. 4. By re-
peating only the principal heads of what had been said.
5. By transposing the words and periods. 6. By imi-
tating them.

DIVERSION, in military affairs, is when an en-
cemy is attacked in one place where they are weak and
unprovided, in order to draw off their forces from an-
other place where they have made or intend to make an
irruption. Thus the Romans had no other way in their
power of driving Hannibal out of Italy, but by making a
diversion in attacking Carthage.

DIVESTING, properly signifies undressing, or
stripping off one's garment; in contradistinction from
investing.

In law, it is used for the act of surrendering or re-
linquishing one's effects. By a contract of donation
or sale, the donor or seller is said to be divested and
divided of their property in such a commodity, and
the donee or purchaser becomes invested therewith.
See INVESTITURE.

A demise is a general divestiture which the fathers
and mothers make of all their effects in favour of their
children.

DIVIDEND, in arithmetic, the number proposed
to be divided into equal parts. See ARITHMETIC,
no 14.

DIVIDEND of Stock, is a share or proportion of the
interest of flocks erected on public funds, as the sou-
sea, &c. divided among and paid to the adventurers
half-yearly.

DIVINATION, the knowledge of things ob-
scene or future, which cannot be attained by any
natural means.

It was a received opinion among the heathens, that
the gods were wont to converse familiarly with some
men, whom they endowed with extraordinary powers,
and admitted to the knowledge of their councils and
decisions. Plato, Aristotle, Plutarch, Cicero, and
others, divide divination into two sorts or species, viz.
natural and artificial.

The former was so called, because not attained by
any rules or precepts of art, but inferred or inferred
into the diviner, without his taking any further care
about it than to purify and prepare himself for the re-
ception of the divine affluence. Of this kind were all
those who delivered oracles, and foretold future events
by inspiration, without observing external signs or ac-
cidents.

The second species of divination was called artifi-
ected, because it was not obtained by immediate inspiration,
but proceeded upon certain experiments and observa-
tions arbitrarily instituted, and mostly superstitions.
Of this sort there were various kinds, as by diving,
intrails, flame, cakes, flour, wine, water, birds, lots, vis-
ces, omens, &c.

In holy scripture we find mention made of nine dif-
f erent kinds of divination. The first performed by the
interpreters render augur. 2. Those who in the same
place are called نما مهصفبه 'I, which the Egyptians
and
Divination, and vulgate translate “a man given to ill practices.”
4. Such authors whom Moses in the same chapter, ver. 11, calls רָאוֹת בְּבֵית אֹזְרֵת. 5. Tho’ those who consult the spirits called יִשְׁרואִים; or, as Moses expresses it in the same book, יַעֲקֹב וּלְמָה "those who ask questions of Pythion." 6. Witches or magicians, whom Moses calls יְרוֹמֵי יִדּוֹנֵם. 7. Tho’ who consult the dead, micro-

mancers. 8. The prophet Moses, chap. iv. ver. 12, mentions such as consult slaves, עֲקֹב וּלְמָה: which kind of divination may be called ραπτομανία. 9. The last kind of divination mentioned in scripture is ἱεροσόφημα or the consideration of the liver.

Divination of all kinds was necessarily made an occult science, which naturally remained in the hands of the priests and priestesses, the magi, the soothsayers, the augurs, the visionaries, the priests of the oracles, the false prophets, and other like professors, till the time of the coming of Jesus Christ. The light of the gospel, it is true, has dissipat’ed much of this darknefs; but it is more difficult, than is commonly conceived, to eradicate from the human mind a deep-rooted superstitious error, even though the error be fed in the foregone age, especially when the error has been believed almost from the origin of the world: for we still find existing among us the main remains of this pagan superstition, in the following chimeras, which enthusiastic and designing men have formed into arts and sciences: though it must be owned, to the honour of the 18th century, that the pure doctrines of Christianty, and the spirit of philosophy, which become every day more diffused, equally concur in banishing these visionary opinions. The vogue for these pretended sciences and arts, moreover, is past, and they can no longer be named without exciting ridicule in all sensible people. By relating them here, therefore, and drawing them from their obscurity, we only mean to shew their tendency, and to mark those roots again which the human mind, without the assistance of a pilot, might easily run.

For the attaining of these supernatural qualifications, there are still existing in the world the remains of;
1. Astrology: a conjectural science which teaches to judge of the effects and influences of the stars; and to predict future events by the situation of the planets and their different aspects. It is divided into natu-
ral astrology, or meteorology; which is confined to the foretelling of natural effects, as the winds, rain, hail, and snow, frosts and tempests. In this consists one branch of the art of almanack-makers; and by merely confronting these predictions in the calendar, with the weather each day produces, every man of sense will see what regard is to be paid to this part of astrology. The other part, which is called judicial astrology, is still far more illusive and vain than the former; and having at first the wonderful art of visionaries, it afterwards became that of impostors; a very common fate with all those chimerical sciences, of which we shall here speak. This art pretends to teach the method of predicting all sorts of events that shall happen upon the earth, as well such as relate to the public as to private persons; and that by the fame inspection of the stars and planets and their different constellations. The cabala signifies, in like manner, the knowledge of things that are above the moon, as the celestial bodies and their influences; and in this sense it is the same Divination, with judicial astrology, or makes a part of it.

2. Horoscopy, which may also be considered as a part of astrology, is the art by which they draw a figure, or celestial scheme, containing the 12 houses, wherein they mark the disposition of the heavens at a certain moment; for example, that at which a man is born, in order to foretell his fortune, or the incidents of his life. In a word, it is the disposition of the stars and planets at the moment of any person’s birth. But as there cannot be any probable or possible relation between the constellations and the human race, all the principles they lay down, and the prophecies they draw from them, are chimerical, false, absurd, and a criminal imposition on mankind.

3. The art of augury consisted, among the ancient Romans, in observing the flight, the singing, and eating of birds, especially such as were held sacred. See Augury.

4. The equally deceitful art of horoscopy consisted, on the contrary, in the inspection of the bowels of animals, but principally of victims; and from thence predicting grand incidents relative to the republic, and the good or bad events of its enterprises.

5. Aromancy was the art of divining by the air. This vain science has also come to us from the Pagans; but is rejected by reason as well as Christianity, as false and absurd.

6. Pyromancy is a divination made by the inspection of a flame, either by observing to which side it turns, or by throwing into it some combustible matter, or a bladder filled with wine, or any thing else from which they imagined they were able to predict.

7. Hydromancy is the supposed art of divining by water. The Periains, according to Varro, invented it; Pythagoras and Numa Pompilius made use of it; and we still admire the like wonderful prognosticators.

8. Geomancy was a divination made by observing of cracks or clefts in the earth. It was also performed by points made on paper, or any other substance, at a venture; and they judged of future events from the figures that resulted from thence. This was certainly very ridiculous; but it is nothing less so to pretend to predict future events by the inspection of the grounds of a dish of tea or coffee, or by cards, and many other like matters. Thus have designing men made use of the four elements to deceive their credulous brethren.

9. Chiromancy is the art which teaches to know, by inspecting the hand, not only the inclinations of a man, but his future destiny also. The fools or impostors who practise this art pretend, that the different parts or the lines of the hand have a relation to the internal parts of the body, as to the heart, others to the liver, spleen, &c. On this false supposition, and on many others equally extravagant, the principles of chiromancy are founded: and on which, however, several authors, as Robert Flud an Englishman, Artemidorus, M. de la Chambre, John of Ingina, and many others, have written large treatises.

10. Phyllogramy or phyllogramancy, is a science that pretends to teach the nature, the temperament, the understanding, and the inclinations of men, by the inspection
DIVING, the art or act of descending under water to considerable depths, and abiding there a competent time.

The uses of diving are very considerable, particularly in the fishing for pearls, corals, sponges, &c. See Pearl-Fishing, &c.

There have been various methods propounded, and machines contrived, to render the business of diving more safe and easy. The great point is to furnish the diver with fresh air; without which, he must either make a short stay or perish.

Those who dive for sponges in the Mediterranean, help themselves by carrying down sponges dip't in oil in their mouths. But considering the small quantity of air that can be contained in the pores of a sponge, and how much that little will be constricted by the pressure of the incumbent water, such a supply cannot subsist for so long; ordinary persons beginning to suffocate in a minute. Besides, if the depth be considered, the pressure of the water in the vessels makes the eyes blood-shot, and frequently occasions a spitting of blood.

Hence, where there has been occasion to continue long at the bottom, sponges have contrived double flexible pipes, to circulate air down into a cavity, including the diver as with armour, both to furnish air and to bear off the pressure of the water, and give leave to his breast to dilate upon inspiration; the freth air being forced down one of the pipes with bellows, and returning by the other of them, not unlike to an artery and vein.

But this method is impracticable when the depth surpasses three fathoms; the water embracing the bare limbs so closely as to obstruct the circulation of the blood in them; and withal preffing so strongly on all the juncatures where the armour is made tight with leather, that, if there be the least defect in any of them, the water rushes in, and instantly fills the whole engine, to the great danger of the diver's life.

It is certain, however, that people, by being accustomed to the water from their infancy, will at length be enabled, not only to stay much longer under water than the time abovementioned, but put on a kind of amphibious nature, so that they seem to have the use of all their faculties as well when their bodies are immersed in water as when they are on dry land. Most savage nations are remarkable for this. According to the accounts of the late voyagers, the inhabitants of the South-sea islands are such expert divers, that when a nail or any piece of iron was thrown overboard, they would instantly jump into the sea after it, and never failed to recover it, notwithstanding the quick defeat of the metal. Even among civilized nations, many persons have been found capable of continuing an incredible length of time below water. The most remarkable instance of this kind is the famous Sicilian diver Nicolò Pelle. The authenticity of the account, indeed, depends entirely on the authority of Kircher. He assures us, that he had it from the archives of the kings of Sicily: but, notwithstanding this assertion, the whole hath so much of the marvillous in it, that we believe there are few who will not look upon it to have been exaggerated. In the times of Frederic king of Sicily (says Kircher), there lived a celebrated diver, whose name was Nicholas, and who, from his amazing skill in swimming, and perseverance under water, was accustomed to dive. This man had from his infancy been used to the sea; and earned his scanty subsistence by diving for corals and oysters, which he sold to the villagers on shore. His long acquaintance with the sea, at last, brought it to be almost a part of his natural element. He was frequently known to spend five days in the midst of the waves, without any other provisions than the fish which he caught there and ate raw. He often swam over from Sicily into Calabria, a tempestuous and dangerous passage, carrying letters from the king. He was frequently known to swim among the gulsps of the Lipari islands, no way apprehensive of danger.

Some mariners out at sea, one day observed something of some distance from them, which they regarded as a sea-monster, but upon its approach it was known to be Nicholas, whom they took into their ship. When they asked him whether he was going in a storm and rough a sea, and at such a distance from land, he showed them a packet of letters, which he was carrying to one of the towns of Italy, exactly done up in a leather bag, in such a manner as that they could not be wetted by the sea. He kept them thus company for some time in their voyage, conversing, and asking questions; and after eating an hearty meal with them, he took his leave, and, jumping into the sea, pursued his voyage alone.

"In order to aid these powers of enduring in the deep, nature seemed to have affixed him in a very extraordinary manner: for the spaces between the fingers and toes were webbed, as in a goose; and his chest became so very capacious, that he could take in, at one inspiration, as much breath as would serve him for a whole day.

"The account of his extraordinary person did not fail to reach the king himself; who commanded Nicholas to be brought before him. It was no easy matter to find Nicholas, who generally spent his time in the solitudes of the deep; but, at last, after much searching, he was found, and brought before his major.
Diving

The curiosity of this monarch had been long excited by the accounts he had heard of the bottom of the gulph of Charybdis; he now therefore conceived, that it would be a proper opportunity to have more certain information. He therefore commanded our poor diver to examine the bottom of this dreadful whirlpool; and as an incitement to his obedience, he ordered a golden cup to be hung into it. Nicholas was not infensible of the danger to which he was exposed; dangers well known only to himself; and therefore he prefumed to remonstrate; but the hopes of the reward, the desire of pleasing the king, and the pleasure of showing his skill, at last prevailed. He instantly jumped into the gulph, and was as instantaneously swallowed up in its bosom. He continued for three quarters of an hour below; during which time the king and his attendants remained on shore, anxious for his fate; but he at last appeared, holding the cup in triumph in one hand, and making his way good among the waves with the other. It may be suppos'd he was received with applause when he came on shore: the cup was made the reward of his adventure; the king ordered him to be taken proper care of; and, as he was somewhat fatigued and debilitated by his labour, after a hearty meal he was put to bed, and permitted to refresh himself by sleeping.

When his spirits were thus restored, he was again brought to satisfy the king's curiosity with a narrative of the wonders he had seen; and his account was to the following effect. He would never, he said, have obeyed the king's commands, had he been apprised of half the danger that were before him. These were four things, he said, which rendered the gulph dreadful, not only to men, but to fishes themselves. 1. The force of the water burling up from the bottom, which required great strength to resist. 2. The abruptness of the rocks that on every side threatened destruction. 3. The force of the whirlpool dashing against those rocks. And, 4. The number and magnitude of the polyposus fish, some of which appeared as large as a man; and which, every where sticking against the rocks, projected their fibrous arms to entangle him. Being asked how he was able so readily to find the cup that had been thrown in, he replied, that it happened to be flung by the waves into the cavity of a rock against which he himself was urged in his descent. This account, however, did not satisfy the king's curiosity. Being requested to venture once more into the gulph for further discoveries, he at first refused: but the king, desirous of having the most exact information possible of all things to be found in the gulph, repeated his solicitations; and, to give them full greater weight, produced a larger cup than the former, and added also a purse of gold. Upon these considerations the unfortunate diver once again plunged into the whirlpool, and was never heard of more.

To obviate the inconveniences of diving to those who have not the extraordinary powers of the diver abovementioned, different instruments have been contrived. The chief of these is the diving bell, which is most conveniently made in form of a truncated cone, the smaller base being closed, and the larger open. It is to be puffed with lead; and so suspended, that the vessel may float full of air, with its open base down-ward, and as near as may be in a situation parallel to the horizon, so as to close with the surface of the water all at once.

Under this covere the diver, sitting, sinks down with the included air to the depth desired; and if the cavity of the vessel can contain a ton of water, a single man may remain a full hour, without much inconvenience, at five or six fathoms deep. But the lower you go, still the included air contracts itself according to the weight of the water which compresses it: so that at 33 feet deep the bell becomes half full of water, the preasure of the incumbent water being then equal to that of the atmosphere; and at all other depths the space occupied by the compressed air in the upper part of the bell will be to the under part of its capacity filled with water, as 33 feet to the surface of the water in the bell below the common surface thereof. And this compressed air being taken in with the breath soon inuitates itself into all the cavities of that body, and has no ill effect, provided the bell be permitted to descend so slowly as to allow time for that purpose. One inconvenience that attends it, is found in the ears, within which there are cavities which open only externally, and that by pores so small as not to give admission even to the air itself, unless they be dilated and distended by a considerable force. Hence, on the first descent of the bell, a preasure begins to be felt on each ear; which, by degrees, grows painful, till the force overcoming the obstacle, what constricts these pores yields to the preasure, and letting some condensed air slip in, presently eases the effence. The bell descending lower, the pain is renewed, and again eas'd in the same manner.

But the greatest inconvenience of this engine is, that the water entering it, contracts the bulk of air into a smaller compass; that it soon heats and becomes unfit for respiration: so that there is a necessity for its being drawn up to recruit it; besides the uncomfortable abiding of the diver almost covered with water.

To obviate the difficulties of the diving bell, Dr Halley, to whom we owe the preceding account, contrived some further apparatus, whereby not only to recruit and refresh the air from time to time, but also to keep the water wholly out of it at any depth. This manner in which this was effected, he relates in the following words.

"The bell I made use of was of wood, containing about 60 cubic feet in its concavity; and was of the form of a truncate cone, whose diameter at the top was three feet, and at the bottom five. This I coated with lead so heavy that it would sink empty; and I distributed the weight fo about its bottom, that it would go down in a perpendicular direction, and no other. In the top I fixed a strong but-clear glass, as a window, to let in the light from above; and likewise a cock to let out the hot air that had been breathed: and below, about a yard under the bell, I placed a flage which hung by three ropes, each of which was charged with about one hundred weight to keep it steady. This machine I suspended from the mast of a ship by a sprit, which was sufficiently secured by stays to the mast-head, and was directed by braces to carry it overboard clear of the ship's side, and to bring it again within board as occasion required."
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"To supply air to this bell when under water, I caused a couple of barrels of about 36 gallons each to be filled with lead, so as to sink empty; each of them having a bung-hole in its lowest part to let in the water, as the air in them condensed on their descent; and to let it out again when they were drawn up full from below. And to a hole in the uppermost part of these barrels, I fixed a leather trunk or hose well lubricated with bees-wax and oil, and long enough to fall below the bung-hole, being kept down by a weight appended: so that the air in the upper part of the barrels could not escape, unless the lower ends of these hoes were first lifted up.

"The air barrels being thus prepared, I fitted them with tackle proper to make them rise and fall alternately, after the manner of two buckets in a well; which was done with so much ease, that two men, with less than half their strength, could perform all the labour required: and in their descent they were directed by lines fastened to the under edge of the bell, the which passed through rings on both sides the leather hose in each barrel; so that, sliding down by these lines, they came readily to the hand of a man who floated on the stage on purpose to receive them, and to take up the ends of the hoes into the bell. Through these hoes, as soon as their ends came above the surface of the water in the barrels, all the air that was included in the upper parts of them was blown with great force into the bell; whilst the water entered at the bung-holes below, and filled them: and as soon as the air of one barrel had been thus received, as a signal given, that was drawn up, and at the same time the other descended: and, by an alternate succession, furnished air for breath; and to the contrary. Besides, the whole cavity of the bell was kept entirely free from water, so that I sat on a bench which was diametrically placed near the bottom, wholly dressed, with all my clothes on. I only observed, that it was necessary to let down gradually at first, as about 12 feet at a time; and then to stop and drive out the air that entered, by receiving three or four barrels of fresh air before I descended further. But being arrived at the depth designed, I then let out as much of the hot air that had been breathed, as each barrel would replenish with cool, by means of the cock at the top of the bell; through whose aperture, though very small, the air would rush with so much violence, as to make the surface of the sea boil, and to cover it with a white foam, notwithstanding the weight of the water over us.

"Thus I found that I could do any thing that required to be done just under us; and that, by taking off the stage, I could, for a space as wide as the circuit of the bell, lay the bottom of the sea so far dry, as not to be over horses thereon. And, by the glass window, so much light was transmitted, that when the sea was clear, and especially when the sun shone, I could see perfectly well to write or read; much more to talk or lay hold on any thing under us that was to be taken up. And, by the return of the air-barrels, I often sent up orders written with an iron pen, on small plates of lead, directing how to move us from place to place as occasion required. At other times, when the water was troubled and thick, it would be as dark as night below; but in such cases I have been able to keep a candle burning in the bell as long as I pleased, notwithstanding the great expense of air necessary to maintain flame. — By an additional contrivance, I have found it not impracticable for a diver to go out of an engine to a good distance from it, the air being conveyed to him with a continued stream, by small flexible pipes; which pipes may serve as a clue, to direct him back again when he would return to the bell."

Plate CLXIII. fig. 1 shows Dr Halley's diving bell, with the divers at work. DBLKRIMP represents the body of the bell. D, the glass which serves as a window. B, the cock for letting out the air which has been breathed. L, the leads. C, one of the air-barrels. P, H, two of the divers. F, another diver at a distance from the bell, and breathing through the flexible tube K. — This diver is supposed to have a head-piece of lead, made to fit quite close about his shoulders; this head-piece was capable of containing as much air as would supply him for a minute or two. When he had occasion for more air, he turned a cock at F, by which means a communication was opened with the air in the bell, and thus he could receive a new supply at pleasure.

Since the invention of this diving machine, there has been one contrived by Mr Triewald, F. R. S. and military architect to the king of Sweden, which, for a single person, is in some respects thought to be more eligible than Dr Halley's, and is constructed as follows. A B is the bell, which is sunk by lead weights Fig. 2. DD hung to its bottom. This bell is of copper, and tinned all over in the inside, which is illuminated by three strong convex lenses, G G G, with copper lids H H H, to defend them. The iron ring or plate E serves the diver to stand on when he is at work; and is suspended at such a distance from the bottom of the bell by the chains F F F, that when the diver stands upright, his head is just above the water in the bell, where the air is much purer than it is higher up, because it is colder, and consequently more fit for respiration. But as the diver must always be within the bell, and his head of course in the upper part, the inventor has contrived, that even there, when he has breathed the hot air as well as he can, he may, by means of a spiral copper tube be, placed close to the inside of the bell, draw the cooler and freer air from the lowest parts; for which purpose, a flexible leather tube, about two feet long, is fixed to the upper end of the copper tube at b; and to the other end of this tube is fixed an ivory mouth-pipe, by which the diver draws in the air.

The greatest improvement, however, which the diving bell ever received, or probably can receive, was from the late Mr Spalding of Edinburgh. A fiction of his improved diving-bell is represented in fig. 2. This construction is designed to remedy some inconveniences of Dr Halley's, which are very evident, and of very dangerous tendency. These are, 1. By Dr Halley's construction, the sinking or raising of the bell depends entirely
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Intirely on the people who are at the surface of the water; and as the bell even when in the water has a very considerable weight, the raising it not only requires a great deal of labour, but there is a possibility of the rope breaking by which it is raised, and thus every person in the bell would inevitably perish. As there are, in many places of the sea, rocks which lie at a considerable depth, the figure of which cannot possibly be perceived from above, there is danger that some of their ragged prominences may catch hold of one of the edges of the bell in its descent, and thus overset it before any signal can be given to those above, which would infallibly be attended with the destruction of the people in the bell: and as it must always be unknown, before trial, what kind of a bottom the sea has in any place, it is plain, that without some contrivance to obviate this last danger, the defect in Dr Halley’s diving bell is not at all eligible.

How these inconveniences are remedied by Mr Spalding’s new contrivance will be easily understood from the following description. — A B C D represents a section of the bell, which is made of wood e, e, are iron hooks, by means of which it is suspended by ropes Q B F e, and Q A E R e, and Q S, as expressed in the figure; e, e, are iron hooks, to which are appended lead weights, that keep the mouth of the bell always parallel to the surface of the water, whether the machine taken altogether is lighter or heavier than an equal bulk of water. By these weights alone, however, the bell would not sink; another is therefore added, represented at L, and which can be raised or lowered at pleasure, by means of a rope passing over the pulley a, and fastened to one of the sides of the bell at M. As the bell descends, this weight, called by Mr Spalding the balance weight, hangs down a considerable way below the mouth of the bell. In case the edge of the bell is caught by an obstacle, the balance-weight is immediately lowered down so that it may rest upon the bottom. By this means the bell is lightened so that all danger of oversetting is removed; for being lighter, without the balance-weight, than an equal bulk of water, it is evident that the bell will rise, as far as the length of the rope affixed to the balance-weight will allow it. This weight, therefore, will serve as a kind of anchor to keep the bell at any particular depth which the divers may think necessary; or by pulling it quite up, the defect may be continued to the very bottom.

By another very ingenious contrivance, Mr Spalding rendered it possible for the divers to raise the bell, with all the weights appended to it, even to the surface, or to float at any particular depth, as they think proper; and thus they could still be safe, even though the rope designed for pulling up the bell was broke. For this purpose the bell is divided into two cavities, both of which are made as tight as possible. Just above the second bottom E F, are small slits in the sides of the bell; through which the water, entering as the bell descends, displaces the air originally contained in this cavity, which flies out at the upper orifice of the cock G H. When this is done, the divers turn the handle G, which stops the cock; so that if any more air was to get into the cavity AE F B, it could not longer be discharged through the orifice H as before. When this cavity is full of water, the bell sinks; but when a considerable quantity of air is admitted, it rises. If therefore the divers have a mind to raise themselves, they turn the small cock g, by which a communication is made between the upper and under cavities of the bell. The consequence of this, is that a quantity of air immediately enters the upper cavity, forces out a quantity of the water contained in it, and thus renders the bell lighter by the whole weight of the water which is displaced. Thus, if a certain quantity of air is admitted into the upper cavity, the bell will descend very slowly; if a greater quantity, it will neither ascend or descend, but remain stationary; and if a larger quantity of air is still admitted, it will arise to the top. It is to be observed, however, that the air which is thus let out into the upper cavity must be immediately replaced from the air-barrel; and the air is to be let out very slowly, or the bell will rise to the top with so great velocity that the divers will be in danger of being shaken out of their seats. But, by following these directions, every possible accident may be prevented, and people may descend to great depths without the least apprehension of danger. The bell also becomes so easily manageable in the water, that it may be conducted from one place to another by a small boat with the greatest ease, and with perfect safety to those who are in it.

Instead of wooden sets used by Dr Halley, Mr Spalding made use of ropes suspended by hooks b b ; and on these ropes the divers may sit without any inconvenience. I and K are two windows made of thick strong glass, for admitting light to the divers. N represents an air-cask with its tackle, and O C P the flexible pipe through which the air is admitted to the bell. In the ascent and descent of this cask the pipe is kept down by a small weight appended, as in Dr Halley’s machine. R is a small cock by which the hot air is discharged as often as it becomes troublesome. Fig. 4 is a representation of the whole diving apparatus, which it is hoped will be readily understood without any further explanation. Two air-barrels are represented in this figure; but Mr Spalding was of opinion, that one capable of containing 30 gallons is sufficient for an ordinary machine. We are told of another method put in practice by a gentleman of Devonshire. He has contrived a large cask of strong leather, perfectly water-proof, which may hold about half a hoghead of air. This is so contrived, that, when he fluts himself up in this cask, he may walk at the bottom of the sea, and go into any part of a wrecked vessel, and deliver out the goods. This method, we are told, he has practised for many years, and has thus acquired a great fortune. It would be a considerable improvement on this machine to condense the air in it as much as possible before the diver descended; as he would thus be furnished with an atmosphere endowed with elasticity sufficient to refill the weight of the water, which otherwise would squeeze his cask into much less room than it originally took up. The condensed air also would serve for respiration a much longer time than that which is in its ordinary state.

Diving-Bladder, a machine invented by Borrelli, and by him preferred, though without any good reason, to the diving-bell. It is a globular vessel of brass or copper, about two feet in diameter, which contains

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the diver's head. It is fixed to a goat's-skin habit exactly suited to his person. Within the vessel are pipes; by means of which a circulation of air is contrived; and the person carries an air-pump by his side, by which he can make himself heavier or lighter as fishes do, by contracting or dilating their air bladder. By this means he thought all the objections to which other diving machines are liable were entirely obviated, and particularly that of want of air; the air which had been breathed, being, as he imagined, deprived of its noxious qualities by circulating through the pipes. These advantages, however, it is evident, are only imaginary. The diver's limbs, being defended from the pressure of the water only by a goat's-skin, would infallibly be crushed if he descended to any considerable depth; and from the discoveries now made by Dr Priestley and others, it is abundantly evident, that air, which is once rendered foul by breathing, cannot in any degree be restored by circulation through pipes. Concerning the use of copper machines in general, Mr Spalding favoured us with the following curious observation. That when occasion has been made of introducing in them a few minutes, he feels in his mouth a very disagreeable brassy taste, which continues all the time he remains in the vessel; so that, on this account, copper seems by no means an eligible material. This taste most probably arises from the action of the alkaline effluvia of the body upon the copper; for volatile alkali is a strong dissolvent of this metal; but how these effluvia volatile and the copper in such a manner as to make the taste of it sensible in the mouth, it is not easy to say.

DIVINITY, properly signifies the nature, quality, and essence of God.

DIVINITY, is also used in the same sense with theology.

DIVISIBILITY, that property by which the particles of matter in all bodies are capable of a separation or diffusion from each other.

The Peripatetics and Cartesians hold divisibility to be an affection of all matter. The Epicureans, again, allow it to agree to every physical continuum; but they deny that this affection agrees to all bodies, for the primary corpuscles or atoms they maintain to be perfectly incommunicable and indivisible.

As it is evident that body is extended, so it is no less evident that it is divisible: for since no two particles of matter can exist in the same place, it follows, that they are really distinct from each other; which is all that is meant by being divisible. In this sense the least conceivable particle must still be divisible, since it will consist of parts which will be really distinct. To illustrate this by a familiar instance. Let the least imaginary piece of matter be conceived lying on a smooth plain surface, it is evident the surface will not touch it everywhere; those parts therefore which it does not touch may be supposed separable from the others, and so on as far as we please; and this is all that is meant when we say matter is infinitely divisible.

The infinite divisibility of mathematical quantity is demonstrated thus geometrically. Suppose the line AC perpendicular to BF, and another, as GH, at a small distance from it, also perpendicular to the same line; with the centre CCC, &c. describe circles cutting the line GH in the points sed, &c. Now the greater the radius AC is, the less is the part eh. But divisibility the radius may be augmented in infinitum; so long, therefore, the part eh may be divided into still less portions; consequently it may be divided in infinitum. All that is supposed in strict geometry (says Mr Maclaurin) concerning the divisibility of magnitude, amounts to no more than that a given magnitude may be conceived to be divided into a number of parts equal to any given number; and particularly that the number of parts into which a given magnitude may be conceived to be divided, is not to be fixed or limited, because no given number is so great but a greater may be conceived and assigned; but there is not, therefore, any necessity of supposing the number of parts actually infinite; and if some have drawn very abstruse conclusions from such a supposition, yet geometry ought not to be loaded with them.

How far matter may actually be divided, may in some measure be conceived from hence, that a piece of wire gilt with so small a quantity as eight grains of gold, may be drawn out to a length of 13,000 feet, the whole surface of it still remaining covered with gold. We have also a surprising instance of this in the division of some parts of matter from the nature of light and vision. Let a candle be lighted, and placed in an open plain, it will then be visible two miles round; and consequently was it placed two miles above the surface of the earth, it would fill with luminous particles a sphere whose diameter was four miles, and that before it had lost any sensible part of its weight. A quantity of vitriol being dissolved, and mixed with 9000 times as much water, will tinge the whole; consequently will be divided into as many parts as there are visible portions of matter in that quantity of water. There are perfumes, which, without a sensible diminution of their quantity, shall fill a very large space with their odoriferous particles; which must therefore be of an inconceivable smallness, since there will be a sufficient number in every part of that space sufficiently to affect the organ of smelling. Dr Keill demonstrates, that any particle of matter, how small soever, and any finite space, how large soever, being given, it is possible for that small particle of matter to be diffused through all that space, and to fill it in such a manner, as that there shall be no pore in it whose diameter shall exceed any given line.

The chief objections against the divisibility of matter in infinitum are, That an infinite cannot be contained by a finite; and that it follows from a divisibility in infinitum, either that all bodies are equal, or one infinite is greater than another. But the answer to these is easy: for the properties of a determined quantity are not to be attributed to an infinite considered in a general sense; and who has ever proved that their could not be an infinite number of infinitely small parts in a finite quantity, or that all infinites are equal? The contrary is demonstrated by mathematicians in innumerable infinities. See the article INFINITUS, and 'S Geogr. 

DIVISION, in general, is the separating a thing into two or more parts.

Mechanical Division, signifies that separation which is occasioned in the parts of a body by help of mechanical instruments.—The mechanical division of bodies does
Divorce.

"--v--" JU~:5 fluently and consequently the points of

Different methods are used to divide bodies according

to their nature. Those which are tenacious and elastic,
as horns and guns, require to be cut, rasped, or filed.
Metals, because of their ductility, require the same

treatment: but as they are also fusible, they may be

melted, into water. All brittle bodies may be redu­
ted to a fine powder than by porphyrisation.

Thus the white flag denotes the first division of
France; the white and blue the second; and the third
is characterized by the blue. In Britain, the first admiral,
or the admiral of the fleet, displays the union­
flag at the main-top-mast head; next follows the white
flag with St George's cross; and afterwards the blue.

When a fleet consists of 60 sail of the line, that is,
of ships having at least 60 cannon each, the admiral
divides it into three squadrons, each of which has its
divisions and commanding officers. Each squadron
has its proper colours, according to the rank of the
admiral who commandeth, and every division its proper
malt. Thus the white flag denotes the first division of
France; the white and blue the second; and the third
characterized by the blue. In Britain, the first admiral,
or the admiral of the fleet, displays the union­
flag at the main-top-mast head; next follows the white
flag with St George's cross; and afterwards the blue.

The private ships carry pendants of the same colour
with their respective squadrons at the mast of their
particular divisions: so that the last ship in the division
of the blue squadron carries a blue pendant at her
mizen-top-mast head.

Divisor, in arithmetic. See Arithmetic, n.11.

DIUM (anc. geog.), a town of Chalcidice in Ma­
cedonia, near mount Athos. Also a promontory of
Crete, on the north side of the island. — A third Dium
a promontory of Eubea; or a town of that name in
Eubea, near the promontory Cenusem, on the north­
west side of the island, called also Dia. — A fourth Dium
in Pieria of Macedonia, on the west side of the Simus
Thermicus: Strabo and Livy place it on the borders
of Pieria to the south, at the foot of mount Olympus
through Thessaly. That it was a splendid city appears
from Polybius; who relates, that its gymnasion and
walls were overthrown by the Ætolians. From which
overthrow, however, it again recovered, Alexander
adding new splendor to it, by the brazen statues cast
by Lyippus, and erected there in memory of the slain
at the Granicus: an ornament which was continued
down to the time of the Romans; who made it a co­
lony, called Diosiæ.—A fifth Dium beyond Jordan,
near Pella in the Pizæa.

Dividorum (anc. geog.), a town of the Medi­
omatrici in Gallia Belgica; situated on the Moselle,
in the spot where now Metz stands: now a city of
Lorraine. E. Long. 6. o Lat. 49. 16.

Divorce, a breach or dissolution of the bond of
marriage. See Marriage; and Law, N. 6 clx. 23.

Divorce is of two kinds: the one, a vincula matri­
moniœ, which alone is properly divorce; the other,
a mensæ & tubae, "a separation from bed and board."

The woman divorced a vincula matrimonii receives all
again that she brought with her; the other has no suit­
able separate maintenance allowed her out of her husband's
income. The first only happens through some essential imple­
mament, as confanguinity or affinity within the degrees
forbidden,
Divorce.

Divorce is forbidden, pre-contract, impotency, adultery, &c. of which impediments the canon law allows 14, comprehended in these verbs:

Errata, caduus, nullus, cognatus, crimen,
Colles, disjunctus, nux, ardo, ligamen, hunchas,
Sistis, attendis, &c. utre coquite,
St passionis, &c. &c. praesumpus tefsis,
Hugam at matre, aetate unius caritati tenuis.

Divorce in Britain is a spiritual judgment, and that there is passed in the spiritual court. Under the old law, the woman divorced was to have of her husband a writing, as St. Jerome and Josephus testify, to this effect: I promise, that hereafter I will say no claim to thee, which was called a bill of divorce.

Divorce was allowed of in great latitude both among the pagans and Jews. At Rome, barrenness, age, difcit, madness, and banishment, were the ordinary causes of divorce. Spartans, between 500 and 600 years after the building of Rome, under the confuhship of M. Attilius, and P. Varus, was the first who put away his wife because she was barren: though Plutarch in his Roman Questions, maintains, that Domitian was the first who permitted divorce. Julianus afterwards added impotence, a vow of chastity, and the profession of a monastic life, as valid reasons of divorce.

The Roman lawyers distinguished between resipudium and divorcium; making the former to be the breaking of a contract or epponual, and the latter separation after matrimony. Romulus enacted a severe law, which suffered not a wife to leave her husband, but gave the man the liberty of turning off his wife, either upon poisoning her children, counterfeiting his private keys, or for the crime of adultery, but if the husband on another occasion put her away, he ordered one moiety of his estate for the wife, and the other to the goddess Ceres: besides an atonement to the gods of the earth. However, in later times, the women as well as the men might sue a divorce. The common way of divorcing was by sending a bill to the woman, containing the reasons of separation, and the tender of all her goods which she brought with her: and this was called resipudium mitisse, or else it was performed in her presence, and before seven witnesses, and accompanied with the formalities of tearing the writings, refunding the portion, taking away the keys, and turning the woman out of doors.

The Grecian laws concerning divorces were different: The Cretans allowed divorce to any man that was afraid of having too many children. The Spartans seldom divorced their wives; and it was extremely scandalous for a woman to depart from her husband. The Athenians allowed divorce on very small grounds, by a bill, containing the reason of the divorce, and approved, if the party appealed, by the chief magistrate; and women also were allowed to leave their husbands on such occasions. Peribns divorcing their wives were obliged to return their portions; otherwise, the Athenian laws obliged them to pay nine obols a month for alimony. The terms expressing the separation of men and women from each other were different: the men were said απαγαγων, or απελοιγων, to dismiss their wives; but wives, αποδιογενε, to leave their husbands.

"The law of Moses (Mr Paley observes), for reasons of local expediency, permitted the Jewish husband to put away his wife, but whether for every cause, or for what cause, appears to have been controverted by the interpreters of those times. Christ, the precepts of whose religion were calculated for more general use and observation, revokes this permission, as given to the Jews, 'for their hardness of heart,' and promises a law which was then to be continued in the case of adultery in the wife: Whosoever shall put away his wife, except it be for fornication, and shall marry another, commit­ted adultery; and who so marrieth her which is put away, doth commit adultery."—Matt. xix. 9.

"Inferior causes may justify the separation of husband and wife, although they will not authorize such a dissolution of the marriage contract as would leave either at liberty to marry again: for it is that liberty in which the danger and mischief of divorces principally consist. The law of Britain, in conformity to this general rule, confines the dissolution of the marriage contract to the single case of adultery in the wife; and a divorce even in that case can only be brought about by the operation of an act of parliament, founded upon a previous sentence in the spiritual court, and a verdict against the adulterer at common law: which proceedings taken together compose as complete an investigation of the complaint as a cause can receive. It has lately been proposed to the legislature to annex a clause to these acts, restraining the offending party from marrying with the companion of his crime, who by the course of proceeding is always known and convicted: for there is reason to fear, that adulterous connections are often formed with the prospect of bringing them to this conclusion; at least, when the seducer has once captivated the affection of a married woman, he may avail himself of this tempting argument to subdue her scruples, and complete his victory; and the legislature, as the business is managed at present, affists by its interposition the criminal design of the offenders, and confers a privilege where it ought to inflict a punishment. The proposal deserved an experiment; but something more penal, it is apprehended would be found necessary to check the progress of this alarming depravity. With other laws might not be framed, directing the fate of the adulterer to descend as in case of her natural death; referring, however, a certain proportion of the produce of it, by way of annuity, for her subsistence (such annuity in no cafe to exceed a certain sum); and also for further suspending the estate in the hands of the heir, as to preserve the inheritance to any children she might bear to a second marriage, in case there was none to succeed in the place of their mother by the first; whether such a law would not render female virtue in higher life less explicable, as well as the seducers of that virtue less desirable, as the society of those who are willing to attempt the reformation of this important but most incorrigible class of the community. A passion for splendor, for expensive amusements and dissipation, is commonly found in that description of women who would become the subjects of such a law, not less inordinate than their other appetites. A severity of the kind proposed applies immediately to that passion. And there is no room for any complaint of injustice, since the provi­sions..."
sions above stated, with others which might be con-

trived, confine the punishment, as far as it is possible,

of the offender; suffering the eftate to remain to the heir, or with the family of the an-
bearer from whom it came, or to attend the appoint-

ments of his will.

"Sentences of the ecclesiastical courts which release

the parties a vinculo matrimonii, by reason of impurity,

frigidity, confanguinity within the prohibited degrees,
prior marriage, or want of the requisite consent of pa-

rents or guardians, are not dilatations of the marriage

contract, but judicial declarations that there never

was any marriage; such impediment subsisting at

the time as rendered the celebration of the marriage

rite a mere nullity. And the rite itself contains an

exception of these impediments. The man and wo-

man to be married are charged, "if they know any

impediment why they may not be lawfully joined

together, to confess it;" and affirmed, "that so many as

are coupled together, otherwife than God's word doth

allow, are not joined together by God, neither is their

marriage lawful;" all which is intended by way of

folemn notice to the parties, that the vow they are

about to make will bind their confciences and au-

thorize their cohabitation only upon the supposi-

tion that no legal impediment exist." 

DIURETICS (from di a fy, and upo urine), medicines

which provoke a diaphrege by urine.

Such is water drank plentifully: white wine drank

in a morning; alkali salts of all kinds; tea-falt, fal-
gemmate, nitre, borax, alum, tartar, fal ammoniaca,
whey, four milk, lemon-juice, &c. Aqueous liquids

are generally diuretic especially if mixed with falt,

and drank cold. Fermented liquors are the

most diuretic of all; and the lefs fo, as they are the faster.

Sharp thin four wines, renihis, &c. as alio acid spirits

of vinegar, falt, sulphur, alum, vitriol, &c. asparagus,
bitter almonds, smallage eryngium, eupatorium,

faifa! &c. are all diuretics.

DIURNAL, in astronomy, something relating to
day; in opposition to nocturnal, which regards the night.

DIVUS, Diva, in antiquity, appellations given to

men and women who had been deified, or placed in

the common gamut. See DEIFICATION, &c.

DIZZINESS, in medicine. See VERTIGO.

DO, in music, a note of the Italian scale, corre-

sponding to t of the common gamut. See MUSIC.

DOBSON (William), an eminent English portrait

and history painter, born at London in 1610. He

served an apprenticeship with one Peck, a stationer

and picture-dealer; and owed his improvement to the

copying some pictures of Titian and Van Dyck, whose

manner he always retained. He had farther obliga-

tions to the latter of these artists; for it is said, that a

picture of his painting being exposed at a shop on

Snow-hill, Van Dyck passing by was struck with it

exceedingly; and enquiring after the author, found

him at work in a poorgarret. Van Dyck had the gene-

rality to equip him in a manner suitable to his merit.

He presented him taking Charles I. who took him un-
der his protection, kept him with him at Oxford all

the time his majesty continued in that city, and not

only sat to him several times for his picture, but cau-
ed the prince of Wales, prince Rupert, and most of the

lords of his court, to do so too. Sir Dobson, how-
ever being somewhat loose and irregular in his way of

life, was far from improving the many opportunities

he had of making his fortune; and died very poor in

1647, at his house in St Martin's Lane.

DOBUNI, or Boduni; an ancient people of Brit-

ain, who possessed the territory which now forms the

counties of Oxford and Gloucester. Both the names of

this British nation seem to have been derived from

the low situation of a great part of the country which

they inhabited: for both Dovu and Bodun signify

"profound" or "low," in the ancient language of Gaul and Britain. The Dobuni are not mentioned

among the British nations who refuted the Romans

under Julius Caesar, which was probably owing to the

distance of their country from the scene of action; and

before the next invasion under Claudius, they had

been so much oppressed by their ambitious neighbours the

Cattivellani, that they submitted with pleasure to the

Romans, in order to be delivered from that oppression.

Cogidunus, who was at that time (as his name im-

ports) prince of the Dobuni, recommended himself so
dexterously to the favour of the emperor Claudius, by

his ready submission, and other means, that he was not

only continued in the government of his own terri-

tories, but had some other states put under his authority.

This prince lived so long, and remained so steady a

friend and ally to the Romans, that his subjects, be-

ing habituated to their obedience in his time, never

revolted, nor stood in need of many forces or forces to

keep them in subjection. This is certainly the reason

that we meet with so few Roman towns and stations in

the country anciently inhabited by the Dobuni. The

Durocornovium of Antoninus, and the Cornium of

Pottemy, are believed by antiquaries to have been the

same place, the capital of the Dobuni, and situated at

Cirencester, in Gloucestershire, where there are many

marks of a Roman station. Clevum or Glevum, in

the thirteenth iter, was probably situated at Avinton on the

Severn. The country of the Dobuni was comprehended

in the Roman province Britannia Prima.

DOCETÆ (from do in to appear) in ecclesiastical

history, the followers of Julius Caifianus, one of the

second century, who revived a notion that had been adopted

by a branch of the Gnostics, against whom St John, Ig-

natus, and Polycarp, had averted the truth of the in-

carnation. They believed and taught, as their name imports, that the actions and sufferings of Jesus Christ

were not in reality, but only in appearance.

DOCIMASIA, in Greek antiquity, a probation of

the magistrates and persons employed in public bui-

ness at Athens. It was performed publicly in the for-
mum, where they were obliged to give account of them-

selves and their past life before certain judges. A-
mong several questions proposed to them, we find the

following: Whether they had been dutiful to their pa-


tients,
DOCTOR, a person who has passed all the degrees of a faculty, and is empowered to teach or pronounce the same: thus we say, doctor in divinity, doctor in physic, doctor of laws.

The establishment of the doctorate, such as now in use among us, is ordinarily attributed to Irnerius, who himself drew up the formulary. The first ceremony of this kind was performed at Bologna, in the person of Bulgarus, who began to profess the Roman law, and on that occasion was solemnly promoted to the doctorate, i.e. infallible juris stricte dexter. But the custom was soon transferred from the faculty of law to that of theology; the first instance whereof was given in the university of Paris, where Peter Lombard and Gilbert de la Portree, the two chief divines of those days, were created doctors in theology, sacer theologiae doctores.

Spelman takes the title of doctor not to have commenced till after the publication of Lombard's sentences, about the year 1140; and affirms, that such as explained that work to their scholars were the first that had the appellation of doctors. Others go much higher, and hold Bede to have been the first doctor at Cambridge, and John de Beverle at Oxford, which latter died in the year 721. But Spelman will not allow doctor to have been the name of any title or degree in England till the reign of king John, about the year 1207.

To pass doctor in divinity at Oxford, it is necessary the candidate have been four years bachelor of divinity. For doctor of laws, he must have been seven years in the university to commence bachelor of law; five years after which he may be admitted doctor of laws. Otherwise, in three years after taking the degree of master of arts, he may take the degree of bachelor in law; and in four years more, that of L.L. D. which fame method and time are likewise required to pass the degree of doctor in physic.

At Cambridge, to take the degree of doctor in divinity, it is required the candidate have been seven years bachelor of divinity. Though in several of the colleges the taking of the bachelor of divinity's degree is dispensed with, and they may go out per flatum. To commence doctor in laws, the candidate must have been five years bachelor of law, or seven years master of arts. To pass doctor in physic, he must have been bachelor in physic five years, or seven years master of arts. A doctor of the civil law, in England, may exercise ecclesiastical jurisdiction, though a layman, Star 37 Hen. VIII. cap. 17. feit. 4.

Doctor of the Law, a title of honour among the Jews. The infeiture, if we may to say, of this order was performed by putting a key and small book in their hands: which is what some authors imagine our Saviour had in view, Luke xi. 52, when, speaking of the doctors of the law, he says, "Wo unto you doctors of the law, for ye have taken away the key of knowledge: ye entered not in yourselves, and them that were entering ye hindered."

Doctor of the Church, a title given to certain of the fathers whose doctrines and opinions have been most generally followed and authorized. We usually reckon four doctors of the Greek church, and three of the Latin. The first are St. Athanasius, St. Basil, St. Gregory Nazianzen, and St. Chrysostom. The latter are
DODD, [76]

DODD

DOCUMENT

St. Jerom, St. Augustine, and Gregory the Great. In the
Roman breviary there is a particular office for the
doctors. It only differs from that of the confessors,
by the anthem of the Magnificat, and the lessons.

Doctors, is also an appellation adjoined to several
specific epithets, expressing the merit of some of the
schoolmen: thus, Alexander Fales is called the irre-
fragable doctor; Thomas Aquinas, the angelic doctor;
St. Bonaventure, the seraphic doctor; John Duns Sco-
tus, the subtile doctor; Raimond Lully, the illuminat-
ed doctor; Roger Bacon, the admirable doctor, &c.

Doctor, in modern times, is a particular
office, appointed to interpret part of the scrip-
tures. He who interprets the Gospels, is called 
docor of the Gospels; he who interprets St. Paul’s Epistles,
docor of the Apostle: he who interprets the Psalms,
docor of the Psalter.

Doctor-Comments. See College of Civilians.

DOCUMENT, in law, some written monument
produced in proof of any thing affected.

DODARTIA, in botany: A genus of the angio-
spermia order, belonging to the didynamia class of
plants; and in the natural method ranking under the
vicar of Bourne in Lincolnshire, was born May 29.
1729. He was a zealous observer of the university,
and admitted, in the year 1745, a fizar of Clare-Hall.
In 1749-50 he took the degree of B. A. with great honour,
being upon that occasion in the list of wranglers.
Leaving the university, he imprudently married a Miss Mary
Parkins in 1751, was ordained a deacon the same year,
and soon became a celebrated and popular preacher.
His first preferment was the deanship of Wilt-Ham.
In 1754 he was also chosen lecturer of St Olave’s,
Hart-Street; and in 1757 took the degree of M. A.
at Cambridge. On the foundation of the Magdalen
Hosipal in 1758, he was a firensuous supporter of that
charity, and soon after became preacher at the chapel
of it. By the patronage of Bishop squire, he in 1763
obtained a prebend of Brecon, and by the interest of
some city-friends procured himself to be appointed one
of the king’s chaplains; soon after which, he had the
education of the present earl of Chesterfield committ-
ed to his care. In 1706 he went to Cambridge and
took the degree of L. L. D. At this period, the esti-
mation in which he was held by the world was sufficient
to give him expectations of preferment, and hopes of
riches and honours; and these he probably have
acquired, had he possessed a common portion of pru-
dence and discretion. But, impatient of his situation,
and eager for advancement, he rashly fell upon means
which in the end were the occasion of his ruin. On
the living of St. George, Hanover-Square, becoming
vacant, he wrote an anonymous letter to the chancel-
lor’s lady, offering 500 guineas if by her aiffiance he
was promoted to it. This being traced to him, com-
plaint was immediately made to the king, and Dr Dodd
was dismissed with disgrace from his office of chaplain.
From this period he lived neglected, if not despised;
and his extravagance still continuing, he became in-
volved in difficulties, which tempted him to forge a
bond from his late pupil lord Chesterfield, Feb. 4,
1777, for L. 4200, which he actually received; but
being detected, he was tried at the Old Bailey, found
guilty, and received sentence of death; and, in spite
of every application for mercy, was executed at Ty-
burn, June 27, 1777. Dr Dodd was a voluminous
writer, and possesed considerable abilities, with little
judgment and much vanity. An accurate list of his
various writings is prefixed to his “Thoughts in Pris-
on,” ed. 1781.

DODGER, in botany. See CUSCUTA.

DODDRIDGE (Philip), D. D. an eminent Presby-
terian minister, was the son of Daniel Doddridge an
oil-man in London, where he was born on the 26th of
June 1702; and having completed the study of the
classes in several schools, was, in 1719, placed under
the tuition of the reverend Mr John Jennings, who
kept an academy at Kilworth in Leicestershire. He was
first settled as a minister at Kilworth, where he preach-
ed to a small congregation in an obscure village: but,
on Mr Jennings’s death, succeeded to the care of his
academy; and soon after was chosen minister of a large
congregation of Dissenters at Northampton, to
which he removed his academy, and where the number of his
pupils increased. He instructed his pupils with the
freedom and tenderness of a father; and never expected
nor desired that they should blindly follow his senti-
ments, but encouraged them to judge for themselves.
He checked any appearance of bigotry and unchari-
table sentiments, and endeavoured to cure them by throwing
what might be said in defence of those principles they
disliked. He died at Lichfield, whither he went for the
recovery of his health; and his remains were intered
in the burying-ground belonging to the British factory
there, and a handsome monument was erected to his
memory in the meeting-house at Northampton, at the
expense of the congregation, on which is an epitaph
written by Gilbert West, Esq. He wrote, 1. Free
Thoughts on the most probable means of reviving the
Dissenting Interest. 2. The Life of Colonel James
Gardiner. 3. Sermons on the Education of Children.
4. The Rife and Progress of Religion in the Soul.
5. The Family Explicitor, in 6 vols 4to, &c. And since
the author’s death, a volume of his Hymns have been
published, and his Theological Lectures. Several of
his works have been translated into Dutch, German,
and French.

DODECAGON, in geometry, a regular polygon
consisting of twelve equal sides and angles.

DODECAGHEDRON, in geometry, one of the
platonic bodies, or regular solids, contained under
twelve equal and regular pentagons.

DODCANDRIA (from δούκας τωμής, and any
a man) the name of the eleventh clafs in Linnæus’s
sexual system, consisting of plants with hermaphrodite
flowers, that, according to the title, have twelve flami-
νa or male organs. This clafs, however, is not limited
with respect to the number of stamens. Many genera
have sixteen, eighteen, and even nineteen stamens; but
the essential character seems to be, that, in the clafs in que-
tion, the stamens, however numerous, are inserted into
the receptacle: whereas in the next clafs, icoadria,
which is as little determined in point of number as the present, they are attached to the inside of the calyx or flower-cup.

The orders in this class, which are six, are founded upon the number of the styles, or female organs. A-...barbacea, mangoftan, floral, purple loose-strife, wild Syrian rue, and purpure, have only one style: agrimony and heliocarpus have two; burning thorny plant and bastard rocket; three; genus, five; dicoty, eight; and houfe-leek, twelve.

DODECAS, in botany: A genus of the trigyna order, belonging to the dodecadria class of plants. The calyx is half quadrifid, having the corolla above; the corolla quinquifid; the cappace unilocular, conjoined with the calyx.

DODCATEHEON, in botany: A genus of the monogynia order, belonging to the pentandra class of plants; and in the natural method ranking under the 21st order, Pseca. The corolla is verticillated and reflexed: the flamina placed in the tube; the capule unilocular and oblong.

DODO, in ornithology. See Didos.

DODONA, a town of Thesprotia in Epirus, or (according to others) in Thessaly. There was in its neighbourhood a celebrated oracle of Jupiter. The town and temple of the god were first built by Denu-cion, after the universal deluge. It was supposed to be the most ancient oracle of all Greece; and according to the traditions of the Egyptians mentioned by Herodotus, it was founded by a dove. Two black doves, as he relates, took their flight from the city of Thebes in Egypt; one of which flew to the temple of Jupiter Ammon, and the other of Dodona, where with an human voice they acquainted the inhabitants of the country that Jupiter had consecrated the ground, which in future would give oracles. The extensive grove which surrounded Jupiter’s temple was endowed with the gift of prophecy; and oracles were frequently delivered by the sacred doves and the doves which inhabited the place. This doctrine of the oracle of Dodona was explained by Herodotus, who observes that some Phcenicians carried away two priestesses from Egypt, one of which went to fix her residence at Dodona, where the oracle was established. It may farther be observed, that the fable might have been founded upon the double meaning of the word νησιος, which signifies doves in most parts of Greece, while in the dialect of the Epirots it implies old women. In ancient times the oracles were delivered by the murmuring of a neighbouring fountain; but the custom was afterwards changed. Large kettles were suspended in the air near a brazen statue, which held a leaf in its hand. When the wind blew from the statue was agitated and struck again one of the kettles, which communicated the motion to all the rest, and raised that clattering and discordant din, which continued for a while, and from which the artifice of the priest drew the predictions. Some suppose that the noise was occasioned by the shaking of the leaves and boughs of an old oak, which the superfition of the people frequently confulted, and from which they pretended to receive oracles. It may be observed with more probability, that the oracles were delivered by the priests, who, artfully concealing themselves behind the oaks, gave occasion to the super-

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DODONIAEA, in botany: A genus of the monogynia order, belonging to the oclandria class of plants. The calyx is traphyllous; there is no corolla; the calyx unilocular and inflated; the seeds twofold.

DODONIAN, Dodeoneus, in antiquity, an epithet given to Jupiter, because he was worshipped in a temple built in the forest of Dodona, where was the most famous, and (it is said) the most ancient, oracle of all Greece. See DODONA.

DODONIDES, the priestesses who gave oracles in the temple of Jupiter in Dodona. According to some traditions the temple was originally inhabited by seven daughters of Atlas, who nursed Bacchus. Their names were Ambrosia, Eudora, Patithoe, Pytho, Plexaure, Coronis, Tythe, or Tych. In the later ages the oracles were always delivered by three old women; which custom was first established when Jupiter enjoyed the company of Dione, whom he permitted to receive divine honour in his temple at Dodona. The Beotians were the only people of Greece who received their oracles at Dodona from men, for reasons which Strabo, 1. 9, fully explains.

DODRANS, in antiquity, three-fourths of the as. See the article As. DODSLEY (Robert), a late eminent bookfeller, and ingenious writer, born at Mansfield in Nottinghamshire, in the year 1707. He was not intended to education for his literary fame, being originally a live-ry servant; but his natural genius, and early passion for reading, soon elevated him to a superior station. He wrote an elegant little farical farce called The Toy- show, which was acted with applause in 1733, and which recommended him to the patronage of Mr Pope. The following year he produced the King and Miller of Mansfield. The profits of these two farces enabled him to commence bookfeller, and his own merit procured him eminence in that profession. He wrote some other dramatic pieces, and published a collection of his works in one vol. 8vo, under the modest title of Trifles, which was followed by Public Virtue, a poem in 4to. Before what he wrote himself, the public were obliged to him for exerting his judgment in the way of his business; he having collected several volumes of well chosen Miscellaneous Poems and Fugitive Pieces, whose brevity would else have endangered their being totally lost to posterity. He died in 1764.

DODWELL (Henry), a very learned controversial writer, born at Dublin, but of English extraction, in 1641. He wrote an incredible number of tracts; but his services were fo little acknowledged, that bishop Burnet and others accuse him of doing more hurt than good
DOGS

Dreesburg, good to the cause of Christianity, by his indirect love of paradoxes and novelities, and thus exposing himself to the scoffs of unbelievers. His pamphlet on the immortality of the soul gave rise to the well known controversy between Mr Collins and Dr Clark on that subject. He died in 1711.

DOESBURG, a town of the united provinces, in the county of Zutphen and province of Guelderland. It is small, but well peopled, and very strong both by art and nature, having the river Yflel on one side, and a morass on the other, and is only to be approached by a narrow neck of land. E. Long. 5° 55'. N. Lat. 52° 3'.

DOG, in zoology: An animal remarkable for its natural docility, fidelity, and affection for its master; which qualities mankind are careful to improve for their own advantage. These useful creatures guard our houses, gardens, and cattle, with spirit and vigilance. By their help we are enabled to take not only beasts, but birds; and to pursue game both over land and through the waters. In some northern countries, they serve to draw ry burdens. In several parts of Africa, China, and the West Indian negroes, dogs are eaten, and accounted excellent food. Nay, we have the testimony of Mr Forster, that dogs flesh, in tallow, exactly resembles mutton.* They were also used as food by the Romans, and long before them by the Greeks, as we learn from several treaties on agriculture. In the present times, their skins, dressed with the hair on, are used in muffins, made into a kind of buckskin for perkins in the gout, and for other purposes. Prepared in another way, they are used for ladies gloves, and the linings of macks, being thought to make the skin peculiarly white and smooth. The French import many of these skins from Scotland, under a small duty. Here, when tanned, they serve for upper leathers for neat pumps. Dogs' skins dressed are exported under a small and imported under a high duty. The French import from Denmark large quantities of dogs hair, both white and black. The left is esteemed the best, and is worked up in the black stuff of a particular kind of woolen cloth; but is not used, as many have supposed, in making of hats, being entirely unfit for this purpose.

With regard to the qualities of dogs, those bred in the island of Britain are justly reckoned superior to the dogs bred in any other country. The swiftness of the gre-hound is amazing; as are also the steadfastness and perseverance of other hounds and beagles; the boldness of terriers in unearthing foxes, &c.; the sagacity of pointers and homing dogs, who are taught a language by signs as intelligible to sportsmen as speech, and the invisible spirit of a bull-dog, which can be quelled only by death. —All the nations in Europe not only do justice to the superior qualities of the British dogs, but adopt the terms and names, and thankfully receive the creatures as presents. —It is remarkable, however, that almost every kind of British dogs degenerates in foreign countries; nor is it possible to prevent this degeneracy by any art whatever.

For the natural history of the dog, see Canis.

Choosing of Dogs. In order to choose a dog and bitch for good whelps, take care that the bitch come of a generous kind, be well proportioned, having large ribs and flanks; and likewise that the dog be of a good breed and young, for a young dog and an old bitch breed excellent whelps.

The best time for hounds, nitches, or bratchets, to be lined in, are the months of January, February, and March. The bitch should be placed to a kennel, that the may like it after her whelping, and the ought to be kept warm. Let the whelps be weaned after two months old; and though it be some difficulty to choose a whelp under the dam that will prove the best of the litter, yet some approve that which is last, and account him to be the best. Others remove the whelps from the kennel, and lay them severally and apart one from the other; then they watch which of them the bitch first takes and carries into her kennel again, and that they suppose to be the best. Others again imagine that which weighs least when it kicks to be the best: this is certain, that the lighter whelp will prove the swifter. As soon as the bitch has bitten, it is proper to choose them you intend to preserve, and drown the rest: keep the black, brown, or of one colour; for the spotted are not much to be esteemed, though of hounds the spotted are to be valued.

Hounds for chase are to be chosen by their colours. The white, with black ears, and a black spot at the setting on of the tail, are the most principal to compose a kennel of, and of good scent and condition. The black hound, or the black tailed, or the all liver-coloured, or all white: the true talbots are the best for the stronger line; the grizzled, whether mixed or un-mixed, so they be rag-haired, are the best verminers, and a couple of these are proper for a kennel. —In short take these marks of a good hound: That his head be of a middle proportion, rather long than round: his nostrils wide, his ears large, his back bowed; his fillet great, his hunches large, thighs well stuffed, ham strait, tail big near the reins, the refleister: the leg big, the toe of the foot dry, and in the form of that of a fox, with large claws.

Keeping Dogs in Health. —As pointers and spaniels, when good of their kind and well broken, are very valuable to the sportsman, it is worth while to take some care to preserve them in health. This very much depends on their diet and lodging: frequent cleaning their kennels, and giving them fresh straw to lie on, is very necessary; or, in summer-time, deal-havings, or sand, instead of straw, will check the breeding of fleas. If you rub your dog with chalk, and bruith and comb him once or twice a-week, he will thrive much better: the chalk will clear his skin from all greasiness, and he will be the less liable to be many. A dog is of a very hot nature; he should therefore never be without clean water by him, that he may drink when he is thirsty. In regard to their food, carrion is by no means proper for them: it must hurt their senfe of smelling, on which the excellence of these dogs greatly depends. Barley-meal, the drofs of wheat flour, or both mixed together, with broth or skimmed milk, is very proper food. For change, a small quantity of greaves from which the tallow is pressed by the chandlers, mixed with flour, or sheep's feet well baked or boiled, are a very good diet; and when you indulge them with flesh, it should always be boiled. In the season of hunting your dogs, it is proper to feed them in the evening before, and give them nothing in the morning you intend to take them out.
out except a little milk. If you stop for your own refreshment in the day, you should also refresh your dogs with a little bread and milk. It has been already observed that dogs are of a hot constitution; the greatest relief to them in the summer is witch-grass, or dog-grass, which is the same thing. You should therefore plant some of it in a place where you can turn them into every morning: they will feed freely on it to be cured of the fickness they are subject to, and cured of any extraordinary heat of blood; but unless the grass be of this fort, it will have no effect.

**Disvafts of Dogs.**—1. Bites and Stings. If dogs are bitten by any venomous creatures, as snakes, adders, &c., squeeze out the blood, and wash the place with salt and vinegar; then lay a plaster to it made of calamin, pounded in a mortar, with turpentine and yellow wax, till it come to a salve. If you give your dog some of the juice of calamin to drink in milk, it will be good; or an ounce of treacle dissolved in some sweet wine.

2. Mange. Dogs are subject to the mange from being fed too high, and allowed no exercife or an opportunity of refreshing themselves with dog-grass; or by being starved at home, which will cause them to eat the vilest stuff abroad, such as carrion, or even human excrement; or by want of water, and sometimes by no being kept clean in their kennel, or by foundering and melting in their grease. Either of these will heat the blood to a great degree, which will have a tendency to make them mangy. The cure may be effected by giving thyme-brimstone powdered fine, either in milk or mixed up with butter, and rubbing them well every day for a week with an ointment made of some of the brimstone and pork-lard, to which add a small quantity of oil of turpentine. Or, boil four ounces of quicksilver in two quarts of water half the quantity; bathe them every day with this water, and let them have some of it to lick till the cure is performed. Or, a small quantity of trooper’s ointment rubbed on the parts on its first appearance will cure it. It will also free lousy pappises from their lice. Or, take two ounces of euphorbium: flour of sulphur, flanders oil of bays, and soft soap, each four ounces. Anoint and rub your dog with it every other day; give him warm milk, and no water. The cure will be performed in about a week. The following receipt is also said to be efficacious. Take two handfuls of wild crycies, and as much eclecampane, and alo of the leaves and roots of roeb and forrel, and two pounds of the roots of fodrels: boil all these well together in lee and vinegar: strain the decotion, and put into it two pounds of grey loaf, and when it is melted, rub the dog with it four or five days successively, and it will cure him.

3. Poison. If you suspect your dog to be poisoned with nux vomica (the poison usually employed by the warreners, which causes convulsive fits and soon kills), the most effectual remedy, if immediately applied, is to give him a good deal of common salt; to administer which, you may open his mouth, and put a stick across to prevent the fluttering it, whilst you cram his throat full of salt, at the same time holding his mouth upwards; and it will dissolve so that a sufficient quantity will be swallowed to purge and vomit him. When his stomack is sufficiently cleared by a free passage obtained by stool, give him some warm broth frequently, to prevent his expiring from faintness; and he will recover.

4. Worms. Dogs are very frequently troubled with worms; but more particularly while they are young. Any thing bitter is nauseous to these worms, that they are very often voided by taking two or three purges of aloes; or (which is the same thing) Scotts pills, four or five being a dose for a large dog; this is to be repeated two or three times in a week. If this do not succeed, you may give him an ounce of powder of tin mixed up with butter, in three doses; which seldom falls to cure. Or of the herb fannin, dried and rubbed to powder, give about as much as will lie on a shilling for a dose; which will entirely destroy worms and their seed.

6. Sore Feet. A pointer ought not to be hunted oftener than two or three days in a week; and unless you take care of his feet, and give him good lodging as well as proper food, he will not be able to perform that through the season. You should therefore, after a hard day’s hunting, wash his feet with warm water and salt; and when dry, wash them with warm broth, or beer and butter, which will heal their forefeet, and prevent a settled flux of fluxes from fixing.

7. Strains, Blow, or Small Wounds. If your dog has received any little wounds by forcing through hedges, or gets any lameness from a blow or strain; bathe the wound or grieved part with salt and cold vinegar (for warming it only evaporates the fine spirit); and when dry, if a wound, you may pour in it a little fritar’s balsam, which will perform the cure sooner than any method hitherto experienced.

8. Coughs and Colds. Dogs are very subject to a cough, with an extraordinary choking, which is thought to arise generally from a cold or some inward disorder; and probably it is often occasioned by their eating of fish-bones. To guard against it, order your servants to throw all such fish-bones where the dog can’t get at them. But if the disorder be from a cold, let bleeding be repeated in small quantities, if necessary; but if it be what is called the distemper in dogs, and they appear to be very low in spirits, the bleeding is better omitted. Let meat-broth, or milk-broth warmed, be the principal part of his diet, using at the same time the following medicine. Take flour of sulphur, cold drawn linseed oil, and salt-petre, of each an ounce; divide it into four doses, giving him one dose every other day, and let him have plenty of clean straw to lie on; or spice spoonful of honey daily.

**Doo-Madness.** Of this there are no less than seven sorts common among dogs. The chief causes are, highfeeding, want of exercife, fullness of blood, and coldness. As for the two first, you must observe with you hunt them, that they should be better fed than when they rest; and let them be neither too fat nor too lean; but, of the two, rather fat than lean; by which means they will not only be preferred from madness but also from the mange and scab; which diseases they will be subject to for want of air, water, or exercife; but if you have but the knowledge to keep them in an even temper, they may live long, and continue sound. As for water, they should be left to their own pleasure; but for exercife and diet, it must be ordered according to discretion, observing a medi-
Um. Give them once a week, especially in the heat of the year, five or six spoonfuls of salol-oil, which will cleanse them: at other times, the quantity of a hazel-nut of mithridate is an excellent thing to prevent diseases. It is also very good to bleed them under the tongue, and behind the ears.

The symptoms of madnefs are many and easily discerned. When any dog separates himſelf contrary to his former habit, becomes melancholy or droops his head, forbears eating, and as he runs snatch at every thing; if he often looks upwards, and his ſtern (if we may feaſt on) be a little erect, and the ſicle hanging down; if his eyes be red, his breath strong, his voice hoarſe, and he driſvels and foams at the mouth; you may be allured he has this diſtemper.

The ſeven forts of madneſs are as follow; of which the two firſt are incurable. 1. The hot burning madneſs. 2. The running madneſs. The animals labouring under these are peculiarly dangerous; for all things they bite and draw blood from will have the fame diſtemper; and they generally feize on all they meet with, but chiefly on dogs: their pain is fo great it foon kills them.—The five curable cauſes are.-

5. Sleeping madneſs, fo called from the dog's great draw-vines, and almost continual ſleeping. This is cauſed by the little worms that breach in the mouth of the stomach, from corrupt humours, vapours, and funes which arefend to the head: for cure of which, take ſix ounces of the juice of wormwood, two ounces of the powder of harthorn burnt, and two draams of agaric: mix all these together in a little white-wine, and give it the dog to drink in a drenching horn.

6. Dumb madneſs, lies also in the blood, and causes the dog not to feed, but to hold his mouth wide open, frequently putting his feet to his mouth, as if he had a bone in his throat: to cure this, take the juice of black helſhore, the juice of Spatula petrida, and of rue, of each four ounces; drain them well, and put thereto two draams of unprepared fcammony: and if you find him after some time still to droop, the beſt way is to hang him.

Some have afferted their having cured ſeveral creatures that have been bit by mad dogs, with only giving them the middle yellow bark of buckthorn; which must be boiled in ale for a horse or cow, and in milk for a dog; but that it must be boiled till it is as butter as you can take it.

As to the preventive of warming dogs, see WORMING.

5. Dog-Feath. See CANICULA.

Dog-Fiſh, in ichthyology. See Squalus.

Dog-Flax. See Apocynum.

Dog-Wood Tree. See Piscidia.

Doge, the chief magiftrate in the republics of Venice and Genoa.

The word properly signifies duke, being formed from the Latin dux: as dogate, and dogado, from ducaus, "duchy."

The dogate, or office and dignity of doge, is eleſtive; at Venice, the doge is elected for life; at Genoa, only for two years; he is addressed under the title of Serenity, which among the Venetians is superior to that of highneſs.

The doge is the chief of the council, and the mouth of the republic; yet the Venetians do not go into mourning at his death, as not being their sovereign, but only their firſt minifter. In eſteem, the doge of Venice is no more than the phantom or shadow of the majefty of a prince; all the authority being referred to the republic. He only lends his name to theenate; the power is diffufed throughout the whole body, though the anſwers be all made in the name of the doge. If he gives any anſwers on his own ac‐count, they muſt be very cautiously expreſſed, and in general terms, otherwife he is fure to meet with a reprimand. So that it is absolutely neceſsary he be of an easy and pliable disposition.

Anciently the dogs were sovereigns; but things are much altered; and at preſent, all the prerogatives reffered to the quality of doge, are theſe which follow: he gives audience to ambaffadors; but does not give them any anſwer from himself, in matters of any importance; only he is allowed to anſwer according to his own pleasure, to the compliments they make to the ſignory; such anſwers being of no conſequence. The doge, as being firſt magiftrate, is head of all the councils; and the credentials which the fenate furniſhes its minifters in foreign courts, are written in his name;
Doge

[81]

Dole

name and yet he does not sign them; but a secretary of state signs them, and seals them with the arms of the republic. The ambassadors direct the doge, and yet he may not open them, but in presence of the counsellors. The money is stuck in the doge's name, but not with his stamp or arms. All the magistrates rise, and salute the doge when he comes into council; and the doge rises to patches to the doge; and yet he may not go out of Venice without leave given by decree of the council: and his family is not under the jurisdiction of the master of the ceremonies; and his children may have flail-officers, and gondoliers in livery.

His grandeur, at the same time, is tempered with a variety of circumstances, which render it burdensome. He may not go out of Venice without leave of the council; and if he does go out, he is liable to receive affronts, without being intitled to demand satisfaction; and, if any disorder should happen where he was, it belongs not to him, but to the podesta, as being invested with the public authority, to compose it.

The children and brothers of the doge are excluded from all the chief offices of state. They may not receive any benefice from the court of Rome; but are allowed to accept of the cardinalate, as being no benefice, nor of any jurisdiction. The doge may not pick himself of his dignity, for his ease; and after his death, his conduct is examined by three inquisitors and five correctors, who sift it with great severity.

DOGGER, a Dutch fishing vessel navigated in the German Ocean. It is generally employed in the herring fisheries; being equipped with two masts, viz., a main-mast and a mizen-mast, and somewhat resembling a ketch. See Plate at this article Ship.

DOGGERS, in the English alum works, a name given by the workmen to a fort of stone found in the same mines with the true alum rock, and containing foreign alum, though not near so much as the right kind. The county of York, which abounds greatly with the true alum rock, affords also a very considerable quantity of these doggers; and in some places they approach so much to the nature of the true rock, that they are wrought to advantage.

DOGMA, a principle, maxim, tenet, or settled opinion, particularly with regard to matters of faith and philosophy.

DOGMATICAL, something belonging to a doctrine or opinion. A dogmatical philosopher is one who afferts things positively; in opposition to a sceptic, who doubts of every thing.

DOGMATISTS, a sect of ancient physicians, of which Hippocrates was the first author. They are also called Logici, "logicians," from their using the rules of logic in subjects of their profession. They laid down definitions and divisions; reducing diseases to certain genera, and those genera to species, and furnishing remedies for them all; supposing principles, drawing conclusions, and applying those principles and conclusions to particular diseases under consideration; in which sense, the dogmatists stand contradistinguished from empirics and methodists. They reject all medicinal virtues that they think not reducible to manifest qualities; but Galen hath long ago observed of such men, that they must either deny plain matter of fact, or affirm but very poor reasons and causes of many effects they pretend to explain.

DOLCE (Carlo, or Carlino), a celebrated history and portrait painter, was born at Florence in 1616, and was the disciple of Vignali. This great master was particularly fond of representing pious subjects, though he sometimes painted portraits; and his works are easily distinguished by the peculiar delicacy with which he perfected all his combinations, by a pleasing tint of colour, and by a judicious management of the chiaro-scuro. His performance was remarkably slow; and it is reported that his brain was fatally affected by seeing Luca Jordan dispatch more business in four or five hours than he could have done in as many months. He died in 1686.

DOLE, in the Saxon and British tongue, signified a part or portion, most commonly of a meadow, where several persons have shares. It also still signifies a distribution or dealing of alms, or a liberal gift made by a great man to the people.

DOLCE, in Scots law, signifies a malevolent intention. It is essential in every crime, that it be committed intentionally, or by an act of the will: hence the rule, Cremo doo contrabitter.

DOLICHOS, in botany: A genus of the decandra order, belonging to the eudendrilla class of plants; and in the natural method rank under the 23d order, Papilionaceae. The barks of the vexillum has two callous knobs, oblong, parallel, and comprising the axis below. There are 25 species; the most remarkable of which are the following.

1. The lablab, with a winding flax, is a native of warm climates, where it is frequently cultivated for the table. Mr. Hallequin informs us, that it is cultivated in the Egyptian gardens, but is not a native of that country. The Egyptians make pleasant arbours with it in their houses and gardens, by suspending the stem and trailing it where they think proper. They grow it in herb gardeners, but tie it with cords; by which means the leaves form an excellent covering, and an agreeable shade.

2. The joja is a native of Japan, where it is termed daitsu; and, from its excellence, many; that is, "the legumen or pod," by way of eminence. It grows with an erect, slender, and hairy stalk, to the height of about four feet. The leaves are like those of the garden kidney bean. The flowers are of a bluish white, and produce duced from the bottom of the leaves, and succeeded by fistula.

3. The peas, or pisum sativum, is a plant with bright hanging pods resembling those of the yellow lupine, which commonly contain two, sometimes three, large white seeds. There is a variety of this kind, with a small black fruit, which is used in medicine. Kempf affirms, that the seeds of this when pounded and taken inwardly give relief in the affiniae. This legumen is doubly useful in the Japanese kitchens. It serves for the preparation of a substance named wafu, that is used as butter; and likewise a pickle celebrated among them under the name of fojyu or foj. To make the first, they take a measure of mame, or the beans produced by the plant; after boiling them for a considerable time in water, and to a proper degree of softness,
they beat or bray them into a softish pulse; incorporating with it, by means of repeated braying, a large quantity of common salt, four measures in summer, in winter three. The leaf that is added, the substance is more palatable; but what it gains in point of taste, it loses in durability. They then add to this mixture a certain preparation of rice, to which they give the name of koo; and having formed the whole into a compost, remove it into a wooden vesel which had lately contained their common ale or beverage named fauki. In about two months it is fit for use. The koo gives it a grateful taste; and the preparing of it, like the polenta of the Germans, requires the skilful hand of an experienced master. For this reason there are certain people who make it their sole subsistance which cannot fail to succeed; for certain people who make it their sole subsistance which cannot fail to succeed, to ferment; then putting the mass into a pot, they intitle it to a place in the shelter, and raise to a great height when the liquor in wooden vessels. This compound is a peculiar kind of wreath, formed of plaited cordage, to be fastened occasionally round the masts, as a support to the pudding, whole use is to subinate the weight of the fore and main yards in case the rigging or chains by which those yards are suspended should be shot away in the time of battle; a circumstance which might render their fails useless at a season when their subsistance is extremely necessary. See the article Puddening.

DOLPHIN, in ichthyology. See Delphinus. Delphinus of the Mafa, a peculiar kind of wreath, formed of plaited cordage, to be fastened occasionally round the masts, as a support to the pudding, whole use is to subinate the weight of the fore and main yards in case the rigging or chains by which those yards are suspended should be shot away in the time of battle; a circumstance which might render their falls useless at a season when their subsistance is extremely necessary. See the article Puddening.

DOLLAR, or Dollar, a silver coin, nearly of the value of the Spanish piece of eight or French crown.

Dollars are coined in different parts of Germany and Holland; and have their diminutions, as semi-dollars, quarter dollars, &c. See Money-Table.

They are not all of the same fineness nor weight. The Dutch dollars are the most frequent in the Levant. They are called affains, from the impression of a lion thereon.

DOM, or Don, a title of honour, invented and chiefly used by the Spaniards, signifying sir or lord.

This title, it seems, was first given to Delayo, in the beginning of the eighth century. In Portugal no person can assume the title of don without the permission of the king, since it is looked upon as a mark of honour and nobility. In France it is sometimes used among the religious. It is an abridgment of dominus, from dominus.

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form of this piece renders it proper to reflect or rever­
erate a part of the flame upon the matters which are
in the furnace, which has occasioned this kind of furn­
cache to be called a reverberating one. See Furnace.

DOM, or Dom, signifies judgment, sentence, or
decree. The homagers oath in the black book of
Hereford in England ends thus: “So help me God
at his holy dome, and by my trousse,”

DOMENICHINO, a famous Italian painter, born
of a good family at Bologna in 1581. He was at first
a disciple of Calvart the Fleming, but soon quitted his
school for that of the Caraccis. He always applied
himself to his work with much study and thought­ful­
ness; and never offered to touch his pencil but when he
found a proper kind of enthusiasm upon him. His
great skill in architecture also procured him the ap­
pointment of chief architect of the apostolical palace
from Pope Gregory XV.; nor was he without a theo­
retical knowledge in music. He died in 1641.

DOMESDAY, or Doomday, Book, a most an­
cient record, made in the time of William I., surnamed
the Conqueror, and containing a survey of all the lands
of England. It consists of two volumes, a greater and
a less. The first is a large folio, written on 32 double
pages of vellum, in a small but plain character; each
page having a double column. Some of the capital
letters and principal passages are touched with red ink;
and some have stokes of red ink run cross them, as if
scratched out. This volume contains the description
of 31 counties. The other volume is in quarto, written
upon 450 double pages of vellum, but in a single col­
umn, and in a large but very fair character. It con­
tains the counties of Essex, Norfolk, Suffolk, part of
the county of Rutland included in that of Northam­
pton, and part of Lancashire in the counties of York
and Chester.

This work, according to the red book in the ex­
chequer, was begun by order of William the Con­
queror, with the advice of his parliament, in the year
of our Lord 1080, and completed in the year 1086.
The reason given for taking this survey, as ascribed by
several ancient records and historians, was, that every
man should be satisfied with his own right, and not
usurp with impunity what belonged to another. But,
besides this, it is said by others, that now all those
who possessed landed estates became vassals to the king,
and paid him so much money by way of fee or ho­
mage in proportion to the lands they held. This ap­
pears very probable, as there was at that time extant
a general survey of the whole kingdom, made by or­
der of King Alfred.

For the execution of the survey recorded in do­
mesday, book, commissioners were sent into every county
and shire; and juries summoned in each hundred, out
of all orders of freemen, from barons down to the low­
est farmers. These commissioners were to be informed
by the inhabitants, upon oath, of the name of each
manor, and that of its owner; also by whom it was
held in the time of Edward the Confessor; the number
of hides; the quantity of wood, of pasture, and of
meadow-land; how many ploughs were in the demeine,
and how many in the tenanted part of it; how many
mills, how many fish-ponds or fisheries belonged to it;
with the value of the whole together in the time of
king Edward, as well as when granted by king Wil­
laim, and at the time of this survey; also whether it Domesday-
was capable of improvement, or of being advanced in
its value: they were likewise directed to return the
tenants of every degree, the quantity of lands then
and formerly held by each of them, what was the
number of villains or slaves, and also the number and
kinds of their cattle and live stock. These inquiries
being first methodized in the county, were af­
ferwards sent up to the king’s exchequer.

This survey, at the time it was made, gave great
offence to the people; and occasioned a jealousy that it
was intended for some new imposition. But notwithstanding
all the precaution taken by the conqueror to have
this survey faithfully and impartially executed, it
appears from indubitable authority, that a false return
was given in by some of the commissioners; and that,
as it is said, out of a pious motive. This was particu­
larly the case with the abbey of Croyland in Lincol­
shire, the possessions of which were greatly under­
rated both with regard to quantity and value. Per­
haps more of these pious frauds were discovered, as it
is said Ralph Flamard, minifter to William Rufus,
proposed the making a fresh and more vigorous inqui­
fition; but this was never executed.

Notwithstanding this precaution, this falsehood in some
instances, which must throw a suspicion on all others,
the authority of doomsday-book was never permitted
to be called in question; and always, when it hath been
necessary to distinguish whether lands were held in an­
cient demeine, or in any other manner, recourse was
had to domesday-book, and to that only, to determine
the doubt. From this definitive authority, from which,
as from the fentence pronounced at domesday, or the
day of judgment, there could be no appeal, the name of
the book is said to have been derived. But Stowe
assigns another reason for this appellation; namely,
that doomsday-book is a corruption of domus Dei book;
and he supposes that because heretofore deposited in the king’s
treasury, in a place of the church of Westminster or
Winchester, called domus Dei. From the great care for­
erally taken for the preservation of this survey, we may
learn the estimation in which its importance was held.
The dialogue de Scaccariis says, “Liber ille (do­
mesday) figilit regis comes et individuis in theauru.” Un­
til lately it has been kept under three different locks
and keys; one in the custody of the treasurer, and the
others in that of the two chamberlains of the ex­
chequer. It is now deposited in the chapter-house at
Westminster, where it may be consulted on paying to
the proper officers a fee of 6 s. 8 d. for a search,
and fourpence per line for a transcript.

Besides the two volumes abovementioned, there is
also a third made by order of the same king; and which
differs from the others in form more than matter.
There is also a fourth called domesday, which is kept
in the exchequer; which, though a very large volume,
is only an abridgment of the others. In the remem­
brance’s office in the exchequer is kept a fifth book,
likewise called domesday, which is the same with
the fourth book already mentioned. King Alfred had a
roll which he called domesday; and the domesday-book
made by William the Conqueror referred to the time
of Edward the Confessor, as that of king Alfred did
at the time of Ethelred. The fourth book of domes­
day having many pictures and gilt letters in the begin­
Domestic. § 84

Domestic. 

ning relating to the time of King Edward the Confessor, this had led some to a false opinion that domestic day-book was composed in the reign of King Edward.

Domestic, any man who acts under another, serving to compose his family; in which he lives, or is supposed to live, as a chaplain, secretary, &c. Sometimes domestic is applied to the wife and children; but very seldom to servants, such as footmen, lacquies, porters, &c.

Domestic, adj. is sometimes opposed to foreign. Thus "domestic occurrences" signify those events which happen in our own country, in contradistinction to those of which we receive intelligence from abroad.

In its more usual acceptation, the term implies something peculiar to home or household. Thus we speak of domestic happiness or pleasures: meaning the pleasures enjoyed in the bosom of one's family; in opposition to those found in the bottle of public life, or delusively found in the haunts of dissipation.

The felicity of domestic enjoyments has been coveted by the wisest and greatest of men. Senators and heroes have shut out the acclamation of an applauding world, to enjoy the prattling of their little ones, and to partake the endearments of family conversation. They knew that even their best friends, in the common intercourse of life, were in some degree actuated by interests of advantage, in displaying their affection; that many of their followers applauded them in hopes of reward; and that theiddy multitude, however zealous, were not always judicious in their approbation. But the attentions paid them at their fire-side, the smiles which exhilarated their own table, were the genuine result of undiluted love.

To pursue the observations of an elegant essayist; "The nursery has often alleviated the fatigue of the bar and the senate house. Nothing contributes more to raise the gently pleasing emotions, than the view of infant innocence, enjoying the raptures of a game at play. All the sentiments of uncontrolled nature display themselves to the view, and furnish matter for agreeable reflection to the mind of the philosophical observer. To partake with children in their little pleasures, is by no means unmanly. It is one of the purest sources of mirth. It has an influence in amending the heart, which necessarily takes a tininess from the company that surrounds us. Innocence as well as guilt is communicated and increased by the contagion of example. And the great author of evangelical philosophy has taught us to emulate the simplicity of the infantine age. He seems indeed himself to have been delighted with young children, and found in them, what he in vain sought among those who judged themselves their superiors, unpolluted purity of heart.

Among the great variety of pictures which the vivid imagination of Homer has displayed throughout the Iliad, there is not one more pleasing than the family-piece, which represents the parting interview between Hector and Andromache. It deeply interests the heart, while it delights the imagination. The hero ceases to be terrible, that he may become amiable. We admire him while he stands completely armed in the field of battle; but we love him more while he is taking off his helmet, that he may not frighten his little boy with its nodding plumes. We are refreshed with the tender scene of domestic love, while all around breathes rage and discord. We are pleased to see the arm, which is shortly to deal death and destruction among a host of foes, employed in caressing an infant son with the embraces of paternal love. A professed critic would attribute the pleasing effect entirely to contrast; but the heart has declared, previously to the inquiries of criticism, that it is chiefly derived from the satisfaction which we naturally take in beholding great characters engaged in tender and amiable employments.

"But after all that is said of the purity and the solidity of domestic pleasures, they unfortunately appear, to a great part of mankind, insipid, unmanly, and capable of satisfying none but the weak, the spiritless, the inexperienced, and the effeminate. The pretenders to wit and modern philosophy are often found to renounce the received opinions of prudential conduct; and, while they affect a superior liberality, to regulate their lives by the most selfish principles. Whatever appears to have little tendency to promote personal pleasure and advantage, they leave to be performed by those simple individuals, who are dull enough, as they say, to pursue the journey of life by the straight road of common sense. It is true, they will allow, that the world must be replenished by a perpetual succession; and it is not less true, that an offspring, once introduced into the world, requires the care of parental attention. But let the tale be referred for meaner spirits. If the passions can be gratified without the painful consequences of supporting a family, they eagerly seize the indulgence. But the toil of education they leave to those whom they deem fools enough to take a pleasure in it. There will always be a sufficient number, say they, whose folly will lead them, for the sake of a silly passion called virtuous love, to engage in a life of perpetual anxiety. The fool's paradise; they add with derision, will never be deserted.

Prefumptuous as are all such pretenders to newly-invented systems of life and conduct, it is not to be supposed they will think themselves superior to Cicero. Yet Cicero, with all his liberality of mind, felt the tenderness of conjugal and paternal attachment, and acknowledged that, at one time, he received no satisfaction in any company but that of his wife, his daughter, and, to use his own epithet, his Honied young Cicero. The great Sir Thomas More, whom nobody will suspect of narrowness of mind, who by a very singular treatise evinced that he was capable of thinking and of choosing for himself, has left it on record that he devoted a great share of his time, from the united motives of duty and delight, to the amusements of his children.

"It will be objected by those who pretend to have formed their ideas of life from actual observation, that domestic happiness, however pleasing in description, like many a poetick dream, is but an alluring picture, designed by a good heart, and painted in glowing colours by a lively fancy. The constant company, they urge, even of those we love, occasions an indolence. Indolence grows into disgust. Disgust, long continued, fours the temper. Pecuniableness is the natural consequence. The domestic circle becomes the scene of dispute. Mutual antipathy is ingenious in devising mutual torment. Sullen silence or malignant remarks fill up every hour; till the arrival of a stranger causes a temporary
Experience, indeed, proves that these remarks are sometimes verified. But that there is such domestic misery is no argument that there is no domestic happiness, or that the evil may not be removed. Natural stupidity, natural ill temper, acquired ill habits, want of education, illiberal manners, and a neglect of the common rules of decency, will render every species of intercourse disagreeable. When those are united by consubstantial ties who were separated by natural and inherent diversity, no wonder if that degree of happiness which can only result from a proper union, is unknown. In the forced alliance, which the poet of Venusia mentions, of the serpent with the dove, of the tyger with the lamb, there can be no love. When we expatiate on the happiness of the domestic group, we prepossess who all compose it are originally afflicted by affliction, and are still kept in union by different disposition of the parties, and not on the essential nature of family intercourse:

"To form, under the direction of prudence, and by the impulse of virtuous love, an early conjugal attachment, is one of the best securities of virtue, as well as the most probable means of happiness. The duties, which are powerfully called forth by the relations of husband and father, are of that tender kind which inspires goodness and humanity. He who beholds a woman whom he loves, and a helpless infant, looking up to him for support, will not easily be induced to indulge in unbecoming extravagance, or devote himself to indolence. He who has a rising family to introduce into a vicious world, will be cautious of setting a bad example, the contagion of which, when it proceeds from parental authority, must be irresistibly malignant. Thus many who, in their individual and unconnected state, would probably have spent a life not only useless, but profligate and careless in itself, have become valuable members of the community, and have arrived at a degree of moral improvement, to which they would not otherwise have attained.

It is of contempt in which domestic pleasures have in modern times been held, a mark of proficiency. It is also a proof of prevailing ignorance of a real enjoyment. It argues a defect in taste and judgment as well as in morals. For the general voice of the experienced has in all ages declared, that the true happiness is to be found at home."

DOMICILE, in Scots law, is the dwelling-place where a person lives with an intention to remain.

DOMIFYING, in astrology, the dividing or distributing the heavens, into 12 houses, in order to erected a theme, or horoscope, by means of six great circles, called circles of position.

There are various ways of domifying: that of Regiomontanus, which is the most common, makes the circles of position pass through the intersections of the meridian and the horizon: others make them pass through the poles of the zodiac.

DOMINANT (from the Latin word dominarī "to rule or govern"), among musicians, is used either as an adjective or substantive; but these different acceptations are far from being indiscriminate. In both senses it is explained by Rouleau as follows.

"The dominant or sensible chord is that which is practiced upon the dominant of the tone, and which introduces a perfect cadence. Every perfect major chord becomes a dominant chord, as soon as the seventh minor is added to it."

DOMINANT (subj.). Of the three notes essential to the tone, it is that which is a fifth from the tonick. The tonick and the dominant fix the tone; in it they are each of them the fundamental found of a particular chord; whereas the mediant, which constitutes the mode, has no chord peculiar to itself, and only makes a part of the chord of the tonick. Mr. Rameau gives the name of dominant in general to every note which carries a chord of the seventh, and distinguishes that which carries the sensible chord by the name of a tonick dominant; but, on account of the length of the word, this addition to the name has not been adopted by artists: they continue simply to call that note a dominant which is a fifth from the tonick; and they do not call the other notes which carry a chord of the seventh dominants, but fundamentals; which is sufficient to render their meaning plain, and prevents confusion.

A dominant, in that species of church-music which is called plain-chant, is that note which is most frequently repeated or beaten, in whatever degree it may be from the tonick. In this species of music there are dominants and tonicks, but no mediant.

DOMINATION, or DOMINION, in theology, the fourth order of angels or blessed spirits in the hierarchy, reckoned from the seraphim. See Angel.

DOMINGO, or St Domingo, the capital of the island of Hifpaniola in the West Indies, is seated in that part belonging to the Spaniards on the south side of the island, and has a commodious harbour. The town is built in the Spanish manner, with a great square in the middle of it; about which are the cathedral and other public buildings. From this square run the principal streets, in a direct line, they being crossed by others at right angles, so that the form of the town is almost square. The country on the north and east side is pleasant and fruitful; and there is a large navigable river on the west, with the ocean on the south. It is the see of an archbishop, an ancient royal audience, and the seat of the governor. It has several fine churches and monasteries; and is so well fortified, that a fleet and army sent by Oliver Cromwell in 1654 could not take it. The inhabitants are Spaniards, Negroes, Mulattoes, Meltics, and Albattaces; of whom about a sixth part may be Spaniards. It had formerly about 2000 houses; but it is much declined of late years. The river on which it is seated is called Ozama. W. Long. 69. 30. N. Lat. 18. 25.

DOMINIC (de Guzman), founder of the Dominican order of monks, was born at Calaroga in old Castile, 1170. He preached with great fury against the Albigenses, when Pope Innocent III. made a crusade against that unhappy people; and was inquisitor in Languedoc, where he founded his order, and got it confirmed by the Lateran council in 1215. He died
Dominica at Bologna in 1221, and was afterwards canonized. The dominican order has produced many illustrious men. See DOMINICANS.

DOMINICA, one of the Caribbean islands in the West Indies, about 39 miles long and 13 broad, situated between 62° and 62° W. Long. and between 15° and 16° of N. Lat. This island formerly belonged to the French, but was ceded to Britain by the treaty in 1763. It is very advantageous to the latter, as being situated between the French islands of Guadeloupe and Martinico, so that it is equally alarming to both; and its safe and commodious roads enable the British privateers to intercept, without risk, the navigation of France in her colonies, whenever a war happens between the two nations.

This island was reduced, in the year 1778, by the French, under the marquis de Bouillé, governor of Martinico. At that time the French found only of militia to oppose him. All in vain, the only thing the garrison could do was to march where their commander therefore, who made a descent with 2000 men, found only 100 regular forces and a few companies of militia to oppose him. All resistance therefore being vain, the only thing the garrison could do was to procure as favourable terms of capitulation as possible. These were granted with such readiness as did great honour to the character of this officer; the inhabitants experiencing no kind of change except that of transferring their obedience from Britain to France, being left unmolested in the enjoyment of all their rights both civil and religious. The capitulation was strictly observed by the Marquis; no plunder or irregularity being allowed, and a pecuniary gratification being distributed among the soldiers and volunteers who accompanied him in the expedition. An hundred and sixty-four pieces of excellent cannon, and twenty-four regular cannons; that is, a black caisson and a caisson, were found in the place; inasmuch that the French themselves expressed their surprise at finding so few hands to make use of them. The Marquis, however, took care to supply this defect, by leaving a garrison of 1500 of the best men he had with him. It was restored to Britain at the conclusion of the peace in 1783.

La DOMINICA, one of the Marquesas Islands in the South-Sea.

DOMINICAL LETTER, popularly called Sunday Letter, one of the seven letters A B C D E F G, used in almanacks, ephemerides, &c. to denote the days of the week. The word is formed from dominica or dominicus dies, "Lord's-day, Sunday." The dominical letters were introduced into the calendar by the primitive Christians, in lieu of the nundinal letters in the Roman calendar.

DOMINICAL, in church-history. The council of Aixerre, held in 578, decrees, that women communicate with their dominical. Some authors contend, that this dominical was a linen cloth, wherein they received the species, as not being allowed to receive them in the bare hand. Others will have it a kind of veil, wherewith they covered the face. The most probable account is, that it was a sort of linen cloth or handkerchief wherein they received and preserved the eucharist in times of persecution, to be taken on occasion at home. This appears to have been the case by the practice of the first Christians, and by Tertullian's book Ad Usum.

DOMINICANS, an order of religious, called in some places Jacobins; and in others, Predicants, or Preaching Friars.

The Dominicans take their name from their founder Dominic de Guzman, a Spanish gentleman, born in 1170, at Calaroga in Old Castile. He was first canon and archdeacon of Olma; and afterwards preached with great zeal and vehemence against the Albigenites in Languedoc, where he laid the first foundation of his order. It was approved of in 1215, by Innocent III. and confirmed in 1216 by a bull of Honorius III. under the title of St. Augustin; to which Dominic added several austere precepts and observances, obliging the brethren to take a vow of absolute poverty, and to abandon entirely all their revenues and possessions; and also the title of Preaching Friars, because public instruction was the main end of their institution.

The first convent was founded at Tholouse by the bishop thereof and Simon de Monfort. Two years afterwards they had another at Paris, near the bishop's house; and some time after a third in the rue St. Jacques, St. James's street, whence the denomination of Jacobins.

Just before his death, Dominic sent Gilbert de Freney, with twelve of the brethren, into England, where they founded their first monastery at Oxford in the year 1221, and soon after another at London. In the year 1276, the mayor and aldermen of the city of London gave them two whole streets by the river Thames, where they erected a very commodious convent, whence that place is still called Black Friars, from the name by which the Dominicans were called in England.

St. Dominic, at first, only took the habit of the regular canons; that is, a black caiison and rochet; but this he quitted in 1219, for that which they now wear, which it is pretended was shown by the blessed Virgin herself to the beautiful Renaud d'Orléans.

This order is diffused throughout the whole known world. It has forty-five provinces under the general, who resides at Rome; and twelve particular congregations or reforms, governed by vicars general.

They reckon three popes of this order, above sixty cardinals, several patriarchs, a hundred and fifty archbishops, and about eight hundred bishops; besides masters of the sacred palace, whose office has been constantly discharged by a religious of this order, ever since St. Dominic, who held it under Honorius III. in 1218.

Of all the monastic orders, none enjoyed a higher degree of power and authority than the Dominican friars, whose credit was great, and their influence universal. But the measures they used in order to maintain and extend their authority were so pernicious and cruel, that their influence began to decline towards the beginning of the sixteenth century. The tragic story of Jetzer, conducted at Bern in 1509, for determining an uninteresting dispute between them and the Franciscans, relating to the immaculate conception, will reflect indelible infamy on this order. See an account of it in Burnet's travels through France, Italy, Germany, and...
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and Switzerland, p. 31. or Mofheim's Ecl. Hist. vol. iii. p. 294. 8vo. They were indeed perpetually em-
ployed in fignifying with the opprobrious name of
heresy numbers of learned and pious men, in encroach-
ing upon the rights of others, or to augment their possessions; and laying the most iniquitous
fiars and stratagems for the destruction of their
adversaries. They were the principal councilors,
by whose inftigation and advice Leo X. was deter-
ned to the public condemnation of Luther. The pa-
pal fee never had more active and useful abetors than
this order, and that of the Jefuits.

The dogmas of the Dominicans are usually oppo-
tive to thole of the Franciscans.

There are also nuns or sisters of this order, called
in some places Preaching Siifters. These are more
ancient than the friars; St Dominick having founded
a society of religious maids at Prouilles some years
before the infitution of his order of men; viz. in
1206.

There is also a third order of Dominicans, both for
men and women.

DOMINION, DOMINIUM, in the civil law, sig-
nifies the power to ufe or difpofe of a thing as we
please.

DOMINION, or Donation. See DOMINATION.

DOMINIS (Mark Anthony de), archbishop of Spa-
latro in Dalmatia at the clofe of the 15th and begin-
ing of 16th centuries, was a man whose fickness
in religion proved his ruin. His preferment, instead
of attaching him to the church of Rome, rendered
him difaffected to it. Becoming acquainted with
bishop Bedell, while chaplain to Sir Henry Wotton
ambassador from James I. at Venice, he communicated
his books De Republica Ecclefaftica to him; which were
afterwards published at London, with Bedell's correc-
tions. He came to England with Bedell; where he
was received with great respect, and preached and
wrote againft the Roman religion. He is laid to have
had a principal hand in publishing father Paul's History
of the Council of Trent, at London, which was inscribed
to James in 1619. But on the promotion of Pope
Gregory XIV. who had been his school-fellow and
old acquaintance, he was deluded by Gondomar the
Spanifh ambassador into the hopes of procuring a ca-
dinal's hat, by which he fancied he should prove an
instrument of great reformation in the church. Accor-
dingly he returned to Rome in 1622, reckoned his
errors, and was at first well received; but he after-
wards wrote letters to England, repenting his reca-
tion; which being intercepted, he was imprisoned
by Pope Urban VIII. and died in 1625. He was also
the authur of the first philosophical explanation of
the rainbow, which before his time was accounted a pro-
digy.

DOMINIUM EMINENS, in Scots law, that power
which the feign or sovereign has over private pro-
certy, by which the proprietor may be compelled to sell
it for an adequate price where public utility requires.
See Law, No clvii. 1.

DOMINIUM DIRECTUM, in Scots law, the right which
a superior retains in his lands, notwithstanding the
feudal grant to his valid. See Law, No clvii. 1.

DOMINIUM UTILE, in Scots law, the right which the

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vaifal acquires in the lands by the feudal grant from
his superior. See Law, No clxvi. 1.

DOMINUS, in ancient times, a title prefixed to a
name, ufually to denote the perfon either a knight or
a clergyman. See Vie-Dominus.

The title was sometimes alfo given to a gentleman
not dubbed, especially if he were lord of a manor.
See DOM, GENTLEMAN, and SIRE.

In Holland, the title dominus is still retained, to dif-
tinguish a minifter of the reformed church.

DOMITIAN, the Roman emperor, fon to Vef-
pianus, was the laft of the 12 Caefars. See (History
of Rome.

DON, or Tanais, a river of Russia, which takes
its rise from the small lake of St John, near Tuls, in
government of Moccow, and falling through
part of the province of Voronetz, a small portion of
the Ukraina-Slobodkaya, and the whole province
of Azoft, divides itself near Tcherhafk into three
streams, and falls in these separate branches into the Sea of Az-
of. The river has so many windings, is in many parts
so fmall, and abounds with fuch numerous fhoals, as
to be fearcely navigable, excepting in the spring, upon
the melting of the fnows; and its mouth is alfo fo
choked up with fand, that only flat-bottomed veffels,
excepting in the fame feafon, can pass into the sea of
Azoft. The banks of the Don, and the rivulets which
fall into it, are clothed with large tracts of forest, whose
timber is flown down the stream to St Denetri and
Rossft, where the frigates for the fea of Azoft are
chiefly contructed. The navigation of the Don, Mr
Cox obferves, may possibly hereafter be rendered high-
ly valuable, by conveying to the Black Sea the iron of
Siberia, the Chinefe goods, and the Persian merchan-
dize which latter commodities, as well as the pro-
ducts of India, formerly found their way into Europe
through this fame channel.

DON is also the name of a river in Scotland, no-
ticed under the article ABERDEEN; the Old Town
being fituated at its mouth. See ABERDEEN.

DONARIA, among the ancients, in its primary
signification, was taken for the places where the obla-
tions offered to the gods were kept; but afterwards
was ufed to denote the offerings themfelves; and
fometimes, though improperly, the temples.

DONATIA, in botany: A genus of the trigynia
order, belonging to the triandra clafs of plants. The
calyx is a triphljous perianthium, with short fubfu-
lated leaves standing at a distance from one another.
The corolla has from eight to ten petals of an oblong-
linear shape, twice as long as the calyx. The ftami-
ina are three fubfultated filaments the length of the cal-
yx; the anthers roundifh, didymous, and two-lobed
at the bafe.

DONATION, DONATIO, an act or contract where-
by a man transfers to another either the property or
the ufe of the whole or a part of his effects as a free
gift.

A donation, to be valid and complete, fupposes a
capacity both in the donor and the donee; and requires
consent, acceptance, and delivery; and by the French
law regiftary alfo.

DONATION Mortis Caufa, in law, a disposition of
property made by a perfon in his laft ficknefs, who ap-
prehending:
DONATISTS, ancient schisms in Africa, so denominated from their leader Donatus. They had their origin in the year 311, when, in the room of Menfianus, who died in that year on his return to Rome, Caecilian was elected bishop of Carthage, and consecrated without the concurrence of the Numidian bishops, by a few of Africa alone; whom the people refused to acknowledge, and to whom they opposed Majorinus; who, accordingly, was ordained by Donatus bishop of Cæsarea. They were condemned, in a council held at Rome, two years after their separation; and afterwards in another at Arles, the year following; and again at Milan, before Constantine the Great, in 316, who deprived them of their churches, and sent their fdlidious bishops into banishment, and punished some of them with death. Their cause was espoused by another Donatus, called the great, the principal bishop of that sect, who, with numbers of his followers, was exiled by order of Constantine. Many of them were punished with great severity. See Circumcelliones. However, after the accession of Julian to the throne in 362, they were permitted to return, and restored to their former liberty. Gratian published several edicts against them; and in 377 deprived them of their churches, and prohibited all their assemblies. But notwithstanding the severities they suffered, it appears that they had a very considerable number of churches towards the close of this century; but at this time they began to decline, on account of a schism among themselves, occasioned by the election of two bishops, in the room of Parmenian, the successor of Donatus; one party elected Primian, and were called Primianists, and another Maximian, and were called Maximianists. Their decline was also precipitated by the zealous opposition of St. Augustin, and by the violent measures which were purged against them, by order of the emperor Honorius, at the solicitation of two councils held at Carthage; the one in 404, and the other in 411. Many of them were fined, their bishops were banished, and some put to death. This sect revived and multiplied under the protection of the Vandals, who invaded Africa in 427, and took possession of this province; but it funk again under new severities, when their empire was overturned in 534. Nevertheless, they remained in a separate body till the clofe of this century, when Gregory, the Roman pontiff, used various methods for suppressing them; his zeal succeeded, and there are few traces to be found of the Donatists after this period. They were distinguished by other appellations; as Circumcelliones, Montefiti, or Montanism, Campiti, Rapiti, &c. They held three councils, or conciliabules; that of Cirita in Numidia, and two at Carthage.

The errors of the Donatists, beside their schism, were, 1. That baptism conferred out of the church, that is, out of their feet, was null; and accordingly they rebaptized those who joined their party from other churches, and re-ordained their ministers. 2. That theirs was the only true, pure, and holy church; all the rest of the churches they held as prostitute and fallen.

Donatus seems likewise to have given into the doctrine of the Arians, with whom he was closely allied; and, accordingly, St. Epiphanius, Theodoret, and some others, accused the Donatists of Arianism; and it is probable that the charge was well founded, because they were patronized by the Vandals, who were of these sects. But St. Augustine, ep. 185, to count Boniface, &c. &c., affirms, that the Donatists, in this point, kept clear of the errors of their leader.

DONATIVE, DONATISM, a present made by any person; called also gratuity. The Romans made large donatives to their soldiers. Julia Pia, wife of the emperor Severus, is called on certain medals water californem, because of the care she took of the foliery, by interposing for the augmentation of their donatives, &c.

Donative was properly a gift made to the soldier; as congiarium was that made to the people. Salmasius, in his notes on Lampridius, in his Life of Helogabulus, mentioning a donative that emperor gave of three pieces of gold per head, observes, that this was the common and legitimate rate of a donative. Caubon, in his notes on the Life of Pertinax by Caecilius, observes, that Pertinax made a promise of 3000 denarii to each soldier; which amounts to upwards of 79 pounds sterling. The same author writes, that the legal donative was 20,000 denarri; and that it was not customary to give less, especially to the praetorian soldiers; that the centurions had double, and the tribunes, &c. more in proportion.

Donative, in the canon law, a benefice given, and collated to a person, by the founder or patron; without either presentation,installation, or induction by the ordinary.

If chapels founded by laymen be not approved by the diocesan, and, as it is called, spirituisclosed, they are not accounted proper benefices, neither can they be conferred by the bishop, but remain to the pious disposition of the founders; so that the founders, and their heirs, may give such chapels without the bishop.

Gwyn observes, that the king might of ancient time found a free chapel, and exempt it from the jurisdiction of the diocesan; so may he, by letters patent, give liberty to a common person to found such a chapel, and make it donative, not presentable; and the chaplain, or beneficiary, shall be deprivable by the founder or his heir, and not by the bishop. And this seems to be the original of donatives in England.

Donatives are within the statute against simony; and if they have cure of souls, within that against pluralities. If the patron of a donative doth not nominate a clerk, there can be no lapse thereof, unless it be specially provided for in the foundation; but the bishop may compel him to resign it by spiritual censures. But if it be augmented by queen Anne's bounty, it will lapse like other presentative livings. 1. Geo. I. Stat.
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DONNE (Sir John). an excellent poet and divine of the 17th century. His parents were of the Romish religion and assisted their utmost efforts to keep him from it; but his early examination of the controversy between the church of Rome and the Protestants, at last determined him to choose the latter. He travelled into Italy and Spain, where he made many useful observations, and learned their languages to perfection. Soon after his return to England, Sir Thomas Egerton, keeper of the great seal, appointed him his secretary; in which capacity he continued five years. He marrying privately Anne, the daughter of Sir George Moore, then chancellor of the exchequer, and niece to the lord keeper's lady, was dismissed from his place, and thrown into prison. But he was reconciled to Sir George by the good offices of Sir Francis Wolsey. In 1613, he accompanied Sir Robert Drury to Paris. During this time, many of the nobility solicited the king for some secular employment for him. But his majesty, who took pleasure in his conversation, had engaged him in writing his Fuedo Martyr, printed at London in 1610, and so highly pleased with that work, that in 1614 he prevailed with him to enter into holy orders; appointed him one of his chaplains, and procured him the degree of Doctor of Divinity from the university of Oxford. In 1619, he attended the earl of Doncaster in his embassy into Germany. In 1621, he was made dean of St Paul's:

and the vicarage of St Dunstan in the west, in London, soon after fell to him the advowson of it having been given to him long before by Richard Earl of Dorset. By these and other preferments, he was enabled to be charitable to the poor, kind to his friends, and to make good provision for his children. He wrote, besides the above, 1. Devotions upon emergent occasions. 2. The Ancient History of the Septuagint, translated from the Greek of Aristeus, quarto. 3. Three volumes of sermons, folio. 4. A considerable number of poems; and other works. He died in 1631, and was interred in St Paul's cathedral, where a monument was erected to his memory. His writings show him to be a man of incomparable wit and learning; but his greatest excellence was satire. He had a prodigious richness of fancy, but his thoughts were much debated by his verification. He was, however, highly celebrated by all the great men of that age.

DONOR, in law, the person who gives lands or tenements to another in tail, &c.; as he to whom such lands, &c. are given, is the donee.

DORCAS. See DORMSBY Book. See Domesday Book.

DORCHESTER, the capital of Dorsetshire, situated on the river Frome, six miles north of Weymouth. W. Long. 2. 35. N. Lat. 50. 40. It gives the title of marquis to the noble family of Pierpoint, duke of Kingston; and sends two members to parliament.

DORIE, or JOHN DORE, in ichthyology. See DORIE, or JOHN DOREE, in ichthyology. See ZEUS.

DORIA (Andrew), a gallant Genoese sea-officer, born in 1466. He entered into the service of Francis I. of France; but preferred that spirit of independence so natural to a sailor and a republican. When the French attempted to render Savona, long the object of jealousy to Genoa, its rival in trade, Doria remonstrated against the measure in a high tone; which bold action, represented by the malice of his courtiers in the most odious light, irritated Francis to that degree, that he ordered his admirals Barbezieux to fail to Genoa, then in the hands of the French troops, to arrest Doria, and to seize his galleys. This rash order Doria got timely hints of; retired with all his galleys to a place of safety; and, while his retreat was thus raised, he closed with the offers of the emperor Charles V. returned his commission with the collar of St Michael to Francis, and hoisted the Imperial colours. To deliver his country, weary alike of the French and Imperial yoke, from the dominion of foreigners, was now Doria's highest ambition; and the favourable moment offered. Genoa was assisted with the peltulence, the French garrison was greatly reduced and ill-paid, and the inhabitants were sufficiently disposed to second his views. He failed to the harbour with 13 galleys, landed 500 men, and made himself master of the gates and the palace with very little resistance. The French governor with his feble garrison retired to the citadel,
but was quickly forced to capitulate; when the people ran together, and levelled the citadel with the ground. It was now in Doria's power to have rendered himself the sovereign of his country; but, with a magnanimity of which there are few examples, he assembled the people in the court before the palace, disclaimed all pre-eminence, and recommended to them to settle that form of government they chose to establish. The people, animated by his spirit, forgot their factions, and fixed that form of government which has subsisted ever since with little variation. This event happened in 1528. Doria lived to a great age, respected and beloved as a private citizen; and is still celebrated in Genoa by the most honourable of all appellations, "The father of his country, and the restorer of its liberty."

DORIC, in general, any thing belonging to the Dorians, an ancient people of Greece, inhabiting near Mount Parnassus. See DORIS.

Doric, in architecture, is the second of the five orders: being that between the Tuscan and Ionic. It is usually placed upon the Attic base, though originally it had no base. See ARCHITECTURE, nO 43.

At its first invention it was more simple than at present; and when in after-times they came to adorn and enrich it more, the appellation Doric was restricted to this richer manner, and the primitive simple manner they called by a new name, the Tuscan order, which was chiefly used in temples; as the former, being more light and delicate, was for porticos and theatres. The tradition is, that Dorus, king of Achaea, having first built a temple of this order at Argos, on which he dedicated to Juno, occasioned it to be called Doric; though others derive its name, from its being invented or used by the Dorians.

The moderns, on account of its solidity, use it in large strong buildings; as in the gates of cities and citadels, the outsides of churches, and other maUy works, where delicacy of ornaments would be unuitable. The gate of Burlington-house in Piccadilly is of the Doric order.

The most considerable ancient monuments of this order, are the theatre of Marcellus at Rome, wherein the capital, the height of the frize, and its projection, are much smaller than in the modern architecture; and the Parthenon, or temple of Minerva at Athens, in which the short and maUy columns bear upon the pavement without a base; and the capital is a simple torus, with its cincture, and a square, plain, and solid abacus.

Doric Cynæum. See CYMA.

Doric Dialect, one of the five dialects, or manners of speaking, which obtained among the Greeks.

It was first used by the Lacedemonians, and particularly those of Argos; thence it passed into Epirus, Libya, Sicily, the islands of Rhodes, and Crete. In this dialect, Archimedes and Theocritus wrote, who were both of Syracuse; as likewise Pindar.

In Oribarn, however, we should rather define Doric, the manner of speaking peculiar to the Dorians, after their return from Parnassus and Aegopus; and which afterwards came to obtain among the Lacedemonians, &c. Some even diftinguished between the Lacedemonian and Doric; but in reality, they were the same; setting aside a few particularities in the language of the Lacedemonians; as is shown by Rulandus, in his excellent treatise De Lingua Graeca ejusque Dialectis, lib. v.

Besides the authors already mentioned, who have written in the Doric dialect, we might add Archytas of Tarentum, Bion, Callinus, Simonides, Bacchylides, Cypselas, Alcman, and Sophron.

Most of the medals of the cities of Graecia Magna, and Sicily, favour of the Doric dialect in their inscriptions: witness, AMBRAKIAN, AIGLAONIAN, AEK-PONTIAN, AKXTITIAN, PHAAXIAN, TAPAXION, ORP- Mitan, KATAIONIAN, KOPHIAN, TAPOMENTIAN, &c. Which shows the countries wherein the Doric dialect was used.

The general rules of this dialect are thus given by the Port-royalties.

D'o h'a n grand, d'ou, do et d'o l'a fait le Dore.  
D'o fait vun, d'ou, s' o d'o u fait encore.  
Oste o l'infinit; et pour le singulier  
Sert au feminin du nombre pluriel.

But they are much better explained in the fourth book of Rulandus; where he even notes the minister differences of the dialects of Sicily, Crete, Tarentum, Rhodes, Laconia, Macedonia, and Theb. 

The a bounds every where in the Doric; but this dialect bears no conformity with the Eolic, that many reckon them but one.  

Doric Mode, in musick, the first of the authentic modes of the ancients. Its character is to be severe, tempered with gravity and joy; and is proper upon religious occasions, as also to be used in war. It begins, d, la, sol, re. Plato admires the music of the Doric mode, and judges it proper to preferve good manners as being masculine, and on this account allows it to be used in his commonwealth. The ancients had likewise their cupidoric or hypodoric mode, which was one of the plagal modes. Its character was to be very grave and solemn, it began with re, a fourth lower than the doric.

DORING, or DARING, among sportsmen, a term used to express a method of taking larks, by means of a clap-net and a looking-glafe. For this sport there must be provided four flicks very straight and light, about the bignes of a pike; two of these are to be four feet nine inches long, and all notched at the edges or the ends. At one end of each of these flicks there is to be fastened another of about a foot long on one side; and on the other side a small wooden peg about three inches long. Then four or more flicks are to be prepared, each of one foot length; and each of these must have a cord of nine feet long fastened to it at the end. Every one should have a bucke for the commodious fastening on the respective flicks when the net is to be spread.—A cord must also be provided, which must have two branches. The one must have nine feet and a half, and the other ten feet long, with a buckle at the end of each; the rest, or body of the cord must be 24 yards long. All these cords, as well the long ones as those about the flicks, must be well twisted and of the bignes of one's little finger. The next thing to be provided is a staff of four feet long, pointed at one end, and with a ball of wood at the other, for carrying these conveniences in a fack or wallet.  

There should also be carried, on this occasion, a spade,
to level the ground where there may be any little irregularities; and two small rods, each 18 inches long, and having a small rod fixed with a pack-thread at the larger end of the other. To these are to be tied some pack-thread loops, which are to fasten in the legs of some larks; and there are to be reeds to these, that the birds may fly a little way up and down. When all this is done, the looking-glass is to be prepared in the following manner. Take a piece of wood about an inch and an half thick, and cut it in form of a bow, so that there may be about nine inches space between the two ends; and let it have its full thickest at the bottom—so that it may receive it a false piece; in the five corners of which there are to be fixed in five pieces of looking-glasses. These are so fixed, that they may dart their light upwards; and the whole machine is to be supported on a moveable pin, with the end of a long line fixed to it, and made in the manner of the children's play-thing of an apple and a plum-fole; so that the other end of the cord being carried through a hedge, the barely pulling it may let the whole machine of the glasses a-turning. This and the other contrivances are to be placed in the middle between the two nets. The larks fixed to the place, and termed calls, and the glistering of the looking-glasses as they twirl round in the fan, invite the other larks down; and the cord that communicates with the nets, and goes through the hedge, gives the person behind an opportunity of pulling up the nets, so as to meet over the whole, and take everything that is between them. The places where this sort of sporting succeeds best are open fields remote from any trees and hedges except one by way shelter for the sportman: and the wind should always be either in the front or back; for if it blows sideways, it prevents the playing of the net.

DORIS, a country of Greece, between Phocis, Thessaly, and Acarnania. It received its name from Dorus, the son of Deucalion, who made a settlement there. It was called Tetrapolis from the four cities of Pindus or Dryopis Erinicum, Cytinium, Borium, which it contained. To these four fome add Lilæum and Carphia, and therefore call it Hexapolis. The name of Doris has been common to many parts of Greece. The Dorians in the age of Deucalion inhabited Phthiotis, which they exchanged for Hialtiaotis, in the age of Dorus. From thence they were driven by the Cadmeans, and came to settle near the town of Pindus. From thence they passed into Dryopis, and afterwards into Peloponnesus. Hercules having re-established Aegimius king of Phthiotis or Doris, who had been driven from his country by the Lapithæ, the grateful king appointed Hyllus the son of his patron to be his successor, and the Heraclidae marched from that part of the country to go to recover Peloponnesus. The Dorians sent many colonies into different places, which bore the same name as their native country. The most famous of these is in Asia Minor, of which Halicarnassus was once the capital. This part of Asia Minor was called Hexapolis, and afterwards Pentapolis.

Doria, a genus of insects, belonging to the order of vermes tefaccæ. The body is oblong, flat beneath; creeping; mouth placed below: vent behind surroun- ded with a fringe: two feelers, retractile. There are several species. The argo, or lemon doris, has an oval body, convex, marked with numerous punctures, of a lemon colour, the vent befor with elegant ramifications. It inhabits different parts of the British seas, called about Brighthelmstone the lemon-lemon. See Plate CLXIV.

DORMANT, in heraldry, is used for the posture of a lion, or any other beast, lying along in a sleeping attitude with the head on the fore-paws; by which it is distinguished from the couchant, where though the beast is lying, yet he holds up his head.

DORMER, in architecture, signifies a window made in the roof of an house, or above the entablature, being raised upon the rafters.

DORMITORY, a gallery in convents or religious houses, divided into several cells, in which the religious sleep or lodge.

DORMOUSE, in zoology. See Mus and Sciurus.

DORONICUM, LEOPARD'S BANE: A genus of the polygamius furfuræus order, belonging to the lygynes et alis of plants; and in the natural method ranking under the 49th order, Compositæ. The receptacle is naked, the pappus simple; the scales of the calyx in a double row, longer than the disc. The seeds of the radius naked without any pappus. There are three species; of which the only one worthy of notice is the parazandelles, with obtuse heart-shaped leaves. It grows naturally in Hungary, and on the Helvetian mountains: But is frequently preserved in the English gardens. It hath thick flithy roots, which divide into many knobs or knees, sending out strong flithy fibres which penetrate deep in the ground; from these arise in the spring a cluster of heart-shaped leaves, which are hairy, and stand upon footstalks: between these arise the flower-stalks, which are channelled and hairy near three feet high, putting out one or two smaller stalks from the side. Each stalk is terminated by one large yellow flower. The plant multiplies very fast by its spreading roots, and the seeds, if permitted to featter, will produce plants wherever they happen to fall; so that it very soon becomes a weed in the places where it is once established. It loves a moist soil and shady situation. The roots were formerly used in medicine as alexipharmics and purifiers of the blood, but their operation was so violent that they are now entirely laid aside.

DORSAL, an appellation given to whatever be longs to the back. See Dorum.

DORSET (Thomas Sackville), Lord Buckhurst. See Sackville.

DORSET (Charles Sackville), Earl of. See Sack ville.

DORSETSHIRE, a county of England, bounded on the south by the English channel, on the north by Somerfetshire and Wilshire, on the east by Hampshire, and on the west by Devonshire and some part of Somerfetshire. It is between 40 and 50 miles long from east to west, and 24 broad from south to north, and contains 34 hundreds, 22 market-towns, and 248 parishes. This county enjoys a mild, pleasant, and wholesome air, and a deep, rich, and fertile soil, finely diversified. Towards the north it is level, under the high lands that divide it from Somerfetshire, where there are fine arable grounds that will yield large crops of different kinds of grain. But on the south, from the
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DORFABERUS plants, among botanists, such as are of the capillary kind, without stalks, and which bear their seeds on the back-side of their leaves.

DORSTENIA, CONTRARY: A genus of the monogynia order, belonging to the titandra clafs of plants; and in the natural method ranking under the 53d order, Scabride. The receptacle is common, monophyllous, and carnosus; the seeds lying tingly in the carnosus substance. There are four species, all of them low herbaceous plants, growing in the warm countries of America. The root is used in medicine. It is full of knobs; an inch or two in length, about half an inch thick, externally of a reddish brown colour, and pale within; long, tough, slender fibres shoot out from all sides of it, which are generally loaded with small round knobs. The root has a peculiar kind of aromatic smell, and somewhat aromatic, warm, bitterish taste, with a light and sweetish kind of acrimony when chewed. The fibres have little taste or smell; the tuberous part therefore should only be chosen.—Contrary: is one of the mildest of those subtilities call'd aethermatics; it is indubitably a good and useful diaphoretic. Its virtues are extracted both by water and rectified spirit; and do not arise by evaporation with either. The plants cannot be propagated in Britain without the greatest difficulty.

DORSUM, the back, in anatomy comprehends all the posterior part of the trunk of the body from the neck to the buttocks. See Anatomy, No. 29, &c.

DORT, or DORDRECHT, city of Holland, which holds the first rank in the assembly of the states. It is seated in a small island formed by the rivers Meuse, Merwou, Rhine, and Langhe. The Meuse, on which it stands, gives it a good harbour, and separates it from the islands of Nieuwland and Aalsen. It is divided from Leyden by a canal. The harbour is very commodious for the merchandise which come down the Rhine to this Meuse, which keeps it in a flourishing condition. Its strength consists in being surrounded with water. Its walls are old, and defended by round towers. It is very rich, and well built with brick, and had formerly the exclusive right of coining money. It is at present the staple town for wines, particularly Rhenish. It was detached from the main land in 1527, on the 17th of November, by a flood occasioned by the breaking down of the dyke, which overwhelmed 70 villages, and about 100,000 persons. However, by time and the industry of the inhabitants, a great part of the land is recovered. It has two principal canals, namely the New and Old Haven, by which heavy-loaded vessels may enter into the city. Over the Old Haven is a large bridge well built with brick.

Dort was almost reduced to ashes in the year 1457; there being then consumed 2000 houses, with the halls, hospital, and church of Notre Dame: but they are now well provided with fire-engines and watchmen to prevent the like disaster. This city is famous for the meeting of the clergy called the Synod of Dort, in which the Calvinists obtained a sentence against the Arminians, who were called the Remonstrants. The dispute between the contending parties occasioned strange disorders, skirmishes, and murders, in most of the principal cities. Those ministers who would not subscribe to the decree of the synod were banished, of whom there were above 100. E. Long. 4. 36. N. Lat. 51. 39.

Synod of Dort, a national synod, summoned by authority of the States General, the provinces of Holland, Utrecht, and Overyssel excepted, and held at Dort in 1618. The most eminent divines of the United Provinces, and deputies from the churches of England, Scotland, Switzerland, Bremen, Hesia, and the Palatinate, assembled on this occasion in order to decide the controversy between the Comartists or Calvinists and Arminians: the latter of whom were declared corrupters of the true religion. But the authority of this synod was far from being universally acknowledged either in Holland or in England. The provinces of Friesland, Zealand, Utrecht, Guelderland, and Groningen, could not be persuaded to adopt their decisions; and they were opposed by the authority of Archbishop Laud and King James I. in England. The reformed churches in France, though at first disapproving a favourable reception to the decisions of this famous synod, in process of time espoused doctrines very different from those of the Comartists; and the churches of Brandenburgh and Bremen would not suffer their doctors to be tied down to the opinions and tenets of the Dutch divines. The liberty of private judgment with respect to the dogmas of predestination and grace, which the spirit that prevailed among the divines of Dort seemed so much adapted to discourage and suppress, acquired new vigour in consequence of the arbitrary proceedings of this assembly.

DORTMUND, a rich, populous, and imperial city of Germany, in the circle of Westphalia. It is pretty large, but not well built. Formerly it was one of the Hanic towns. Its territory also was formerly a county, and had lords of its own; but since 1504, it hath been polishead entirely by the city.

DORPHORI (from dorphor, and sphaer Ibar), an appellation given to the life-guard-men of the Roman emperors. They were held in such high estimation, as frequently to have the command of the army given on them.—It was usual also for chief commanders to have their dorphori or life-guard to attend them.
DOS, in pharmacy, &c. the quantity of a medicine to be taken at one time. The word is formed from the Greek δός, which signifies gift, or a thing given; from δίωμα, "I give."

DOSETANS, DOSITHAES, an ancient sect among the Samaritans in the first century of the Christian era. Mention is made in Origem, Epiphanius, Jerom, and divers other Greek and Latin fathers, of one Dosithæus, the chief of a faction among the Samaritans; but the learned are not at all agreed as to the time wherein he lived. St. Jerom, in his dialogue against the Lucifrians, places him before our Saviour; wherein he is followed by Drusius, who in his answer to Serrarius places him about the time of Semachæus, king of Assyria. But Scaliger will have him posterior to our Saviour's time; and in effect Origens intimates him to have been contemporary with the apostles; where he observes, that he endeavoured to persuade the Samaritans that he was the Messiah foretold by Moses.

He had many followers; and his sect was still subsisting at Alexandria in the time of the patriarch Eulogius, as appears from a decree of that patriarch published by Photius. In that decree, Eulogius accuses Dosithæus of injuriously treating the ancient patriarchs and prophets, and attributing to himself the spirit of prophecy. He makes him contemporary with Simon Magus; and accuses him of corrupting the Pentateuch in divers places, and of compounding several books directly contrary to the law of God.

Archbishop Ufher takes Dosithæus to be the author of all the changes made in the Samaritan Pentateuch, which he argues from the authority of Eulogius. But all we can justly gather from the testimony of Eulogius is, that Dosithæus corrupted the Samaritan copies since used by that sect; but that corruption did not pass into all the copies of the Samaritan Pentateuch now in use among us, which vary but little from the Jewish Pentateuch: and in this sense we are to understand that passage in a Samaritan chronicle, where it is said that Dosithæus, &c., dosithæus, altered several things in the law of Moses. The author of that chronicle, who was a Samaritan by religion, adds, that their high-priest sent several Samaritans to seize Louis and his corrupted copy of the Pentateuch.

Epiphanius takes Dosithæus to have been a Jew by birth, and to have abandoned the Jewish party for that of the Samaritans. He imagines him likewise to have been the author of the sect of the Sadducees: which seems inconsistent with his being later than our Saviour; and yet the Jews of the time of Eulogius make Dositheus the master of Sadoce, from whom the Sadocees are derived.

Tertullian, making mention of the fame Dositheus, observes, that he was the first who dared to reject the authority of the prophets by denying their inspiration. But he charges that as a crime peculiar to this sectary, which in reality is common to the whole sect, who have never allowed any but the five books of Moses for divine.

DOSSER, a sort of basket to be carried on the shoulders of men. It is used in carrying the overplus earth from one part of a fortification to another where it is wanted. There are likewise small carts and wheel-barrowes for the same use.

DOSSIL, in surgery, is lye made into a cylindric form, or resembling the shape of dates or olive-stones. Dossills are sometimes secured by a thread tied round their middle.

DOTTEREL, in ornithology. See CHARADRIUS. DOU, or Douw. (Gerard). See DOUW.

DOUY, or DOWAY, a large and strong city of the French Netherlands, situated in l. Long. 50. N. Lat. 30. 25. It is situated on the river Scarpe, in a very fertile and pleasant country. The town is large and populous, and exceedingly well fortified. You enter it by six gates, and the streets from each of these gates lead to the market-place. Here is a venerable old town-house, adorned with the statues of the emperors of Klanders, in which the magistrates assemble, and are renewed every thirteen months. Here also are held several county courts for the dependences of Douay, which contain about 30 villages. The parliament of Douay was at first only a supreme council, established at Tournaí in 1668, and erected into a parliament in 1686. But Tournaí being taken by the allies in 1709, the parliament was removed to Cambray; and upon the yielding of Tournaí to the Austrians by the treaty of Utrecht, the parliament was removed to Douay, where it still continues. This city was erected into an university like that of Louvain by Philip II. because of its being in the middle of so many great cities, and Louvain at so great a distance, that the children on that side of the country were generally sent for their education into France. It contains 14 colleges, all governed and settled after the manner of those at Louvain; and the schools of philosophy, canon and civil law, and physic, are disposed also after the same manner, only the rector here is chosen annually. There is a considerable seminary here of English Roman Catholics, founded by Philip II. of Spain about the year 1569. There is also a great number of convents, and among the rest two English, one of Franciscan friars, the other of Benedictine monks. Douay was taken from the Spaniards by the French king in person in 1667, after a short resistance. That prince made it very strong, and built a fort about a cannon shot below it upon the Scarpe, with sluices, by which the adjacent country could be drowned. The allies laid siege to it in 1710, under the command of the Duke of Marlborough; and after a vigorous defence, the town and Fort Scarpe surrendered upon honourable terms. It was retaken by the French in 1712, after the expulsion of arms between Great Britain and France.

DOUBLE; two of a fort, one corresponding to the other.

Double Children, Double Cats, Double Fears, &c. Inflances of these are frequent in the Philosoph. Transact., and elsewhere. See WISSER.

Sir John Floyer, in the same Transactions, giving an account of a double turkey, furnishes some reflections on the productions of double animals in general. Two turkeys, he relates, were taken out of an egg of the common size, when the flesh were well hatched, which grew together by the flesh of the breast-bone, but in all other parts were distinct. They seemed less than the ordinary fize, as wanting bulk, nutrient, and room for their growth; which latter, too, was apparently the occasion of their cohesion. For, having two distinct cavities in their bodies, and two hearts, they must have arisen from two cisticulars; and, consequently,
With respect to what M. D'Alembert adds in his Elements of Music, p. 80, and which he repeats in the Encyclopedia, article Double-emploi, viz. that the chord of the seventh re fa la ut, though we should even regard it only as an inversion of fa la ut re, cannot be followed by the chord ut mi sol ut; "I cannot (says Rousseau) be of his opinion in this point.

"The proof which he gives for it is, that the dissonance ut of the first chord cannot be resolved in the second; and this is true, since it remains in its place: but in this chord of the seventh re fa la ut, inverted from this chord of the superadded sixthth fa la ut re, it is not the ut, but the re, which is the dissonance; which, of consequence, ought to be resolved in ascending upon mi, as it really does in the subseuent chord; so that this procedure in the bas itself is forced, which, from re, cannot without an error return to ut, but ought to ascend to mi, in order to resolve the dissonance.

"M. D'Alembert afterwards shows, that this chord re fa la ut, when preceded and followed by that of the tonic, cannot be authorized by the double-employment; and this is likewise very true; because this chord, though figured with a 7, is not treated as a chord of the seventh, neither when we make our entrance to it, nor our exit from it; or at least that it is not necessary to treat it as such, but simply as an inversion of the super-added sixthth, of which the dissonance is the bas: in which case we ought by no means to forget, that this dissonance is never prepared. Thus, though in such a transition the double-employment is not in question, though the chord of the seventh be no more than apparent, and impossible to be resolved by the rules, this does not hinder the transition from being proper and regular, as I have just proved to theorists. I shall immediately prove to practical artists, by an instance of this transition; which certainly will not be condemned by any one of them, nor justified by any other fundamental bas except my own. (See the Musical Dictionary, Plate D, fig. 14.)

I acknowledge, that this inversion of the chord of the sixth superadded, which transfers the dissonance to the bas, has been censured by M. Rameau. This author, taking for a fundamental chord the chord of the seventh, which results from it, rather chose to make the fundamental bas descend diatonically, and resolve one seventh by another, than to unfold this seventh by an inversion. I had diffipated this error, and many others, in some papers which long ago had passed into the hands of M. D'Alembert, when he was composing his elements of Music; so that it is not his sentiment which I attack, but my own opinion which I defend."

For what remains, the double-employment cannot be used with too much reserve, and the greatest matters are the most temperate in putting it in practice.

**Double Fiché, or Fiché**, in heraldry, the denomination of a crofs, when the extremity has two points; in contradistinction to fiché, where the extremity is sharpened away to one point.

**Double Oktave**, in music, an interval composed of fifteen notes in diatonic progression; and which, for that reason, is called a fifteenth. "It is (says Rousseau) an interval composed of two octaves, called by the Greeks diapason."

It deserves, however, to be remarked, that in intervals less distant and compounded, as in the third the fifth, the
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DOU, the simple name, &c. the lowest and highest extremes are included in the number from whose the interval takes its name. But, in the double octave, when formed a fifteenth, the simple number of which it is composed gives the name. This is by no means analogical, and may occasion some confusion. We should rather choose, therefore, to run any hazard which might occur from uniformly including all the terms of which the component intervals consist, and call the double octave a sixteenth, according to the general analogy. See Interval.

DOUBLET, among lapidaries, implies a counterfeit stone composed of two pieces of crystal, and sometimes glafs softened, together with proper colours between them; so that they make the same appearance to the eye as if the whole substance of the crystal had been tinged with those colours.

The impracticability of imparting tinges to the body of crystals, while in their proper and natural state, and the softness of glafs, which renders ornaments made of it greatly inferior in wear to crystal, gave inducements to the introduction of colouring the surface of crystal wrought in a proper form, in such a manner, that the surfaces of two pieces of coloured glafs being laid together, the effect might appear the same as if the whole substance of the crystal had been coloured. The crystals, and sometimes white transparent glafs so treated, were called doublets; and at one time prevailed greatly in use on account of the advantages, with respect to wear, such doublets had, when made of crystal, over glafs, and the brightness of the colours which could with certainty be given to counterfeit stones this way, when coloured glafs could not be procured, or at least not without a much greater expense. Doublets have not indeed the property which the others have, of bearing to be felt transparent, as is frequently required in drops of ear-rings and other ornaments: but when mounted in rings, or used in such manner that the sides of the pieces, where the joint is made, cannot be inspected, they have a great preference of the coloured glafs; and the art of managing them is therefore, in some degree, of the same importance with that of preparing glafs for the counterfeiting gems; and is therefore properly an appendage to it, as being entirely subervient to the same intention. The manner of making doublets is as follows:

Let the crystal or glafs be first cut by the lapidaries in the manner of a brilliant, except that, in this case, the figure must be composed from two separate stones, or parts of stones, formed in the manner of the upper and under parts of a brilliant, if it is divided in an horizontal direction, a little lower than the middle. After the two plates of the intended stone are thus cut, and fitted so exactly that no division can appear when they are laid together, the upper part must be polished ready for setting; and then the colour must be put between the two plates by this method, "Take of Venice or Cyprus turpentine two scruples; and add to it one scruple of the grains of mastic chosen perfectly pure, free from foulness, and previsely powdered. Melt them together in a small silver or brass spoon ladle, or other vessel, and put to them gradually any of the coloured substances below mentioned, being first well powdered; stirring them together as the colour is put in, that they may be thoroughly commixed. Warm then the doublets to the same degree of heat as the melted mixture; and paint the upper surface of the lower part, and put the upper one instantly upon it, pressing them to each other, but taking care that they may be conjoined in the most perfectly even manner. When the cement or paint is quite cold and set, the redundant part of it, which has been pressed out of the joint of the two pieces, should be gently scraped off the side, till there be no appearance of any colour on the outside of the doublets: and they should then be skillfully set; observing to carry the mounting over the joint, that the upper piece may be well secured from separating from the under one."

The colour of the ruby may be best imitated, by mixing a fourth part of carmine with some of the finest crimson lake that can be procured. The sapphire may be counterfeited by very bright Prussian blue, mixed with a little of the abovementioned crimson lake, to give it a cast of the purple. The Prussian blue should not be very deep-coloured; or but little of it should be used; for otherwise, it will give a black shade that will be injurious to the lustre of the doublets.

The emerald may be well counterfeited by distilled verdigrease, with a little powdered aloes. But the mixture should not be strongly heated; nor kept long over the fire after the verdigrease is added: for the colour is to be soon impaired by it. The resemblance of the garnet may be made by dragon's blood; which, if it cannot be procured of sufficient brightnesse, may be helped by a very small quantity of carmine. The amethyst may be imitated by the mixture of some Prussian blue with the crimson lake; but the proportions can only be regulated by direction, as different parcels of the lake and Prussian blue vary extremely in the degree of strength of the colour.

The yellow topazes may be counterfeited by mixing the powdered aloes with a little dragon's blood, or Spanish anatto: but the colour must be very sparingly used, or the tinge will be too strong for the appearance of that stone. The chrysolite, hyacinth, vinegar garnet, eagle marine, and other, such weaker or more diluted colours, may be formed in the same manner, by lessening the proportions of the colours, or by compounding them together correspondently to the hue of the stone to be imitated; to which end it is proper to have an original stone, or an exact imitation of one, at hand when the mixture is made, in order to more certain adapting the colours to the effect desired; and when these precautions are taken, and the operation well conducted, it is practicable to bring the doublets to so near a resemblance of the true stones, that even the best judges cannot distinguish them, when well set, without a peculiar manner of inspection.

There is, however, an easy method of distinguishing doublets, which is only to behold them betwixt the eye and light, in such position, that the light may pass through the upper part and corners of the stone; when it will easily be perceived that there is no colour in the body of the stone.

DOUBLETS, a game on dice within tables; the men, which are only 15, being placed thus: Upon the
Doubt, among hunters, who say that a hare doubles, when she keeps in plain fields, and winds a boat to deceive the hounds. 

Doubles, or DUBLOON, a Spanish and Portuguese coin, being the double of a pistole. 

Doubling, among sailors, the act of inclining any part of a hostile fleet between two fires, or of cannonading it on both sides. 

It is usually performed by the van or rear of that fleet which is superior in number, taking the advantage of the wind, or of its situation and circumstances, and tacking or veering round the van or rear of the enemy, who will thereby be exposed to great danger, and can scarcely avoid being thrown into a general confusion. 

Doubloons, or DUBLOON, a Spanish and Portuguese coin, being the double of a pistole. 

Doubting, the act of withholding our assent from any proposition, on suspicion that we are not thoroughly apprised of the merits thereof, or from not being able peremptorily to decide between the reasons for and against it. 

Doubtful, said of a ship's being in such a degree of uncertainty as to leave the question open whether it is or is not in distress. 

Doubtful, in rhetoric, a figure wherein the orator appears sometimes fluctuating, and undetermined, what to do or say. 

Doubtful, in navigation, the act of veering round the van or rear of the enemy, and there remain indubitable testimonies of their care and respect for this important place. For the defence of the town, the Romans, or according to some, Arviragus, a British king, their confederate, by cutting out walls with infinite labour in the solid rock, constructed a strong fortress; and, as its venerable remains still prove, eroded, a light-house for the benefit of navigation. The Saxons, Danes, and Normans, had a very high opinion of this place; and when the barons invited over the young prince, afterwards Louis VIII. of France, his father Philip Augustus conceived a bad opinion of the expedition, because the castle and port of Dover were held. 

Doubtful, in rhetoric, a figure wherein the orator appears sometimes fluctuating, and undetermined, what to do or say. 

Tactius furnishes us with an instance of doubling, almost to a degree of distraction, in those words of Tiberius written to the senate: 

Quid fortibus, P. S. aut quum edoctus fuerit, aut quid animo non frimam hoc tempore, dix me deaque pejas perdant quam perire quidquid forte, s. fece. 

Doubts, among sportsmen, denote the terrors of a deer or flag. 

Doubtful, in architecture, a moulding concave above and convex below, serving commonly as a cymatium to a delicate cornice. It is likewise called gula. 

DOVE, in ornithology. See COLUMBA. 

Dove-tailing, in carpentry, is the manner of fastening boards together by letting one piece into another, in the form of the tail of a dove. The dove tail is the strongest of the assemblages or jointings; because the tenon, or piece of wood which is put into the other, goes widening to the extreme, so that it cannot be drawn out again, by reason the extreme or tip is bigger than the hole. 

DOVER, a borough and port town of England, in the county of Kent, situated in E. Long. 0. 25. N. Lat. 51. 10. It sends two members to parliament, styled barons of the Cinque ports, whereas Dover is the chief. Dover gave the title of duke in the Quenbury family, but extinct: now a revived barony in the York family. 

By the Romans this town was named Dubris, and by the Saxons Dofra, probably from the British word Dour, which signifies water. The convenience of its situation drew the attention of the Roman governors, who ruled here while they possessed this part of the island; and there still remain indubitable testimonies of their care and respect for this important place. For the defence of the town, the Romans, or according to some, Arviragus, a British king, their confederate, by cutting out walls with infinite labour in the solid rock, constructed a strong fortress; and, as its venerable remains still prove, eroded, a light-house for the benefit of navigation. The Saxons, Danes, and Normans, had a very high opinion of this place; and when the barons invited over the young prince, afterwards Louis VIII. of France, his father Philip Augustus conceived a bad opinion of the expedition, because the castle and port of Dover were held. 

Dover was brought on by that of the harbour. To recover this, Henry VIII. spent no less than 63,000l. in constructing piers, and 5000l. in building a castle between this and Folkestone, called Sandgate; where the store was flat, and the landing easy. Notwithstanding all this expense, however, it was again choked up in the reign of Queen Elizabeth, by whom it was again cleared at a vast expense, so that ships of some hundred tons could enter it. Since that time it has again declined, notwithstanding of many efforts for its relief, and great assistance from time to time given by parliament for this purpose. As the haven, however,
is still capable of receiving vessels of small burden; and as the packets to France and Flanders are stationed here in time of peace, it is still a place of some consequence, and the people are active and industrious.

**DOVER STREITS**, the narrow channel between Dover and Calais, which separates the island from the opposite continent. Britain is supposed to have been once surrounded, the present straits occupying the site of the isthmus which joined it to Gaul. *No certain cause (says Mr Pennant*) can be given for the mighty con

vulsion which tore us from this continent; whether it was rent by an earthquake, or whether it was worn through by the continual dashing of the waters, no

Pythagoras is left to solve the *Fortuna locorum*. 

*Vidi legem, quad facerat quaedam foliddima tellus Efti frenum:*

But it is most probable, that the great philosopher alluded to the partial destruction of the *Atlantica infida*, mentioned by Plato as a distant tradition in his day. It was effected by an earthquake and a deluge, which might have rent and subdivided the narrow isthmus in question, and left Britain, large as it seems at present, the mere continent. Britain is supposed by many to have been once whole, might have been a

island. The destruction of the Vulfion which tore us from this continent; whether it

submerged, leaves no room to doubt but that the great philosopher Pythagoras

was the first to apply his name to the *Fortuna locorum*.

Although the isthmus is no more, yet the straits remain as a memorial of its former existence. The Scey Isles, the Hebrides, Orkneys, Shetlands, and perhaps the Feroe Islands, may possibly be more than fragments of the once far-extended region. I have no quarrel about the word island. The little isthmus, compared to the whole, might have been a juncture never attended to in the limited navigations of very early times. The peninsula had never been wholly explored, and it passed with the ancients for a genuine island. The correspondence of straits on part of the opposite shores of Britain and France, leaves no room to doubt but that they were once united. The chalky-cliffs of Blancenez between Calais and Bologne, and those to the westward of Dover, exactly tally: the last are vast and continued; the former short, and the termination of the immense bed. Between Bologne and Folkstone (about six miles from the latter) is another memorial of the juncture of the two countries; a narrow submarine hill, called the Rip-raps, about a quarter of a mile broad, and ten miles long, extending eastward towards the Goodwin Sands. Its materials are boulders, adventitious to many strata. The depth of water on it, in very low spring-tides, is only fourteen feet. The fishermen from Folkstone have often touched it with a fifteen feet oar; so that it is justly the dread of navigators, many a tall ship has perished on it, and sunk instantaneously into twenty-fathom* sands*.

In July 1732, the Bellefie of sixty-four guns struck, and lay on it during three hours; but, by starting her beer and water, got clear off.*

These celebrated straits are only twenty-one miles wide in the narrowest part. From the pier at Dover to that at Calais is twenty-four. It is conjectured, that their breadth lessens, and that they are two miles narrower than they were in ancient times. An accurate observer of fifty years remarks to me, that the increased height of water, from a decrease of breadth, has been apparent even in that space. The depth of the channel at a medium in highest spring-tides is about twenty-five fathoms. The bottom either coarse sands or rugged scars, which have for ages unknown re

fited the current of the currents. From the straits both eastward and westward is a gradual increase of depth through the channel to a hundred fathoms, till soundings are totally lost or unattained to. The spring-tides in the straits rise on an average twenty-four feet, the neap-tides fifteen. The tide flows from the German sea, past the straits, and meets, with a great rippling, the western tide from the ocean between Fairleigh near Haftings and Bologne; a proof that the separation of the land was effected by the seas, it must have been by the overpowering weight of those of the north.

**DOVER**, one of the principal towns in the state of Delaware. It is situated in the county of Kent, on St John's river, a few miles from its entrance into Delaware bay, in latitude 39° 30' north; longitude west from Philadelphia 27 minutes.—Ever since the revolution it has been the seat of the state government, and now appears to be pretty rapidly increasing in population and in size. Several handsome buildings have been erected here. Among others, a large elegant state-house, lately finished, occupies and adorns a conspicuous part of the public square. Four freestones intercept each other at right angles in the center of the town, whose incisions form a spacious parade. The houses are principally of brick. By the late enumeration it appears there are between 3,000 and 6,000 inhabitants in this town.

DOUGLAS (Lord). See *History of* Scotland.

DOUGLAS (Gavin), bishop of Dunkeld in Scotland, was the third son of Archibald earl of Angus, and born in the year 1474. Where he was educated, is not known; but it is certain that he studied theology: a study, however, which did not estrange him from the mutes; for he employed himself at intervals in translating into beautiful verse the poem of Ovid de *Remedia Amoris*. The advantages of foreign travel, and the conversation of the most learned men in France and Germany, to whom his merit procured the readiest access, completed his education. With his superior recommendations and worth it was impossible he could remain unnoticed. His first preferment was to be provost of the collegiate church of St Giles in Edinburgh; a place at that time of great dignity and revenue. In the year 1514, the queen mother, then regent of Scotland, appointed Douglas abbot of Aberbrothock, and soon after archbishop of St Andrew's; but the queen's power not being sufficient to establish him in the possession of that dignity, he relinquished his claim in favour of his competitor Foreman, who was supported by the pope. In 1515, he was by the queen appointed bishop of Dunkeld; but that appointment was soon after confirmed by his holiness Leo X. Nevertheless it was some time before he could obtain peaceable possession of his see. The duke of Albany, who in this year was declared regent, opposed him because he was supported by the queen; and, in order to deprive him of his bishopric, accused him of acting contrary to law in receiving bulls from Rome. On this accusation he was committed to the castle of Edinburgh, where he continued in confinement above a year; but the regent and the queen being at last reconciled, he obtained his liberty, and was consecrated bishop of Dunkeld. In 1517, he attended the duke of Albany to France; but returned soon after to Scotland. In 1521, the disputes between the earls of Arran and Angus having thrown the kingdom into violent commotion, our pre- 

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late retired to England, where he became intimately acquainted with Polydore Virgil the historian. He died in London of the plague in 1522; and was buried in the Savoy. He wrote, 1. The Palace of Honour: a most ingenious poem under the similitude of a vision; in which he paints the vanity and inconstancy of all worldly glory. It abounds with incidents, and a very rich vein of poetry. The palace of happiness, in the picture of Cebes, seems to be the ground-work of it. 2. Arcades Narratives: a performance now lost; in which, it is said, he explained, in a most agreeable manner the mythology of the poetical fictions of the ancients. 3. Comedie et drey fuject: None of which are now to be found. 4. Thirteen Bukes of Eneades, of the fanoe poete Virgil, translated out of Latin versets into Scottith metre, every buke having its particular prologue. Imprinted at London 1553, in 40; and reprinted at Edinburgh 1710, in folio. The last is the most esteemed of all his works. He undertook it at the desire of lord Henry Sinclair, a munificent patron of arts in those times; and he completed it in 18 months; a circumstance which his admirers are too fond of repeating to his advantage. David Hume of Godcroft, an author of uncommon merit, and an admired judge of poetry, gives the following testimony in his favour. "He wrote (says he) in his native tongue divers things; but his chiefest work is his translation of Virgil, yet extant, in verse: in which he ties himself so farily as is posible; and yet it is so well expressed, that whooever will easily to do the like, will find it a hard piece of work to go through with it. In his prologues before every look, where he hath his liberty, he sheweth a natural and ample vein of poetry, so pure, pleasant, and judicious, that I believe there is none that hath written before or since but cometh short of him." It has been said, that he compiled an historical treatise De robis Scotiis; but no remain of it hath descended to the present times.

DOUGLAS, the principal town of the Isle of Man, and which has lately increased both in trade and buildings. The harbour, for ships of a tolerable burden, is the fairest in the island, and is much mended by a fine mole that has been built. It is seated on the eastern side. W. Long. 4. 25. N. Lat. 54. 7.

DOUW (Gerhard), a celebrated painter, was born at Leyden in 1613; and received his first instructions in drawing and design from Bartholomeu Dolendo an engraver, and also from Peter Kouwstheoon a painter of glass; but at the age of fifteen he became a disciple of Rembrandt. In that famous school he continued for three years; and then found himself qualified to study nature, the most unerring director.

From Rembrandt he learned the true principles of colouring, and obtained a complete knowledge of the chiaro-scuro; but to that knowledge he added a delicacy of pencil, and a patience in working up his colours to the highest degree of neatness, superior to any other master. He therefore was more pleased with those pictures of Rembrandt which were painted in his youth than those by which he was distinguished in his more advanced age; because the first seemed finished with more care and attention, the latter with more boldness, freedom, and negligence, which was quite opposite to the taste of Douw. But although his manner appears so different from that of his master, yet it was to Rembrandt alone that he owed all that excellence in colouring in which he triumphed over all the artists of his own country.

His pictures usually are of a small size, with figures so exquisitely touched, so transparent, so wonderfully delicate, as to excite admiration as well as pleasure. He designed every object after nature, and with an exactness so singular, that each object appears as perfect as nature itself, in respect to colour, freshness, and force. His general manner of painting portraits was by the aid of a concave mirror, and sometimes by looking at the object through a frame with many exact figures of fine silk. But the latter custom is diffused, as the eye of a good artist seems a more competent rule, though the rule of the former is still practised by the painters in miniature.

It is almost incredible what vast sums have been given and are given at this day for the pictures of Douw, even in his own country; as also in Italy and every polite part of Europe: for he was exceedingly curious in finishing them, and patiently laborious beyond example. Of that picture Sandrart gives a strong proof in a circumstance which he mentions relative to this artist. He says, that having once, in company with Bamboccio, visited Gerhard Douw, they could not forbear to admire the prodigious neatness of a picture which he was then painting, in which they took particular notice of a broom; and expressing their surprise at the excessive neatness of the finishing that minute object, Douw told them he should spend three days more in working on that broom before he should account it entirely complete. In a family picture of Mrs Spiering, the fame author says, that the lady had five days for the finishing one of her hands that leaned on an arm-chair. For that reason not many would fit to him for their portraits; and he therefore indulged himself mostly in works of fancy, in which he could introduce objects of still life, and employ as much time on them as suited his own inclination. Houbraken testifies, that his great patron Mr Spiering allowed him a thousand guilders a-year, and paid before whatever he demanded for his pictures, and purchased some of them for their weight in silver; but Sandrart, with more probability, affures us, that the thousand guilders a year were paid to Gerhard, on no other consideration than that the artist should give his benefactor the option of every picture he painted, for which he was immediately to receive the utmost of his demand. This great master died in 1674, aged 61.

Douw appears inconceivably to be the most wonderful in his finishing of all the Flemish masters. Everything that came from his pencil is precious, and his colouring hath exactly the true and the lovely tints of nature; nor do his colours appear tarnished, nor is their vigour lessened by his patient pencil; for whatever pains he may have taken, there is no look of labour or stiffness; and his pictures are remarkable, not only for retaining their original luster, but for having the fame beautiful effect at a proper distance as they have when brought to the nearest view.

At Turin are several pictures by Gerhard Douw, wonderfully beautiful; especially one, of a Doctor attending a sick woman, and fortune-telling an orphan. The execution of that painting is astonishingly fine, and although the shadows appear a little too dark, the whole
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DOW, or Down-Patrick, a town of Ireland, in the county of Down, is one of the most ancient in that kingdom. It is a market-town and a bishoprick, said to be erected in the fifth century by St Patrick, but is now united to the see of Connor. Within 200 paces of the town, on the ascent of a hill, are the ruins of an old cathedral, remarkable for the tomb of St Patrick the founder, in which they say the bodies of St Bridget and St Columb are also laid. The town, which is seated on the fourth corner of Lough Coin, now called the lake of Strangford, is adorned with several handsome public buildings. Among the hills, and in many islands, are flights of Swans and other water-fowl; and the Lough abounds with salmon, mullets, and other sea-fish. About a mile from this town is St Patrick’s well, which many people frequent to drink at some feasons of the year, and others to perform a penance enjoined them by the popish priests. The linen manufacture is carried on here, as it is in several places in Britain. W. Long. 5. 50. N. Lat. 54. 23.

DOW, the fine feathers from the breasts of several birds particularly of the duck kind.—That of the elder-duck (see ANAS, n° 17.) is the most valuable. These birds pluck it from their breasts and line their nests with it. We are told that the quantity of down found in one nest more than filled the crown of an hat, yet weighed no more than three quarters of an ounce. Br. Zool.—Three pounds of this down may be compressed into a space scarce bigger than one’s fist; yet is afterwards so dilatable as to fill a quilt five feet square. Salern. Orn. p. 416.—That found in the nests is most valuable, and termed live down; it is infinitely more elastic than that plucked from the dead bird, which is little esteemed in Iceland. The best fort is sold at 45 shillings per pound when cleansed, and at 16 when not cleansed. There are generally exported every year, on the company’s account, fifteen hundred or two thousand pounds of both sorts, exclusive of what is privately exported by foreigners. In 1570 the Iceland Company sold as much in quantity of this article as amounted to three thousand seven hundred and forty-five banco dollars, besides what was sent directly to Glückstadt.—Von Troil. p. 146.

DOW, or hair of plants. See HAIR.

DOWNETON, or Dunston, a borough-town of Wiltshire, five miles south of Salisbury. It sends two members to parliament.

DOWHAM, a market-town of Norfolk, ten miles south of Lynn, famous for its good butter; there being 1000, and sometimes 2000, shirkins bought here every Monday, and sent up the river Ouse to Cambridge, from whence it is conveyed to London in the Cambridge-waggons.

DOWNS, a bank or elevation of sand, which the sea gathers and forms along its shores; and which serves it as a barrier. The word is formed from the French dune, of the Celtic duam, a “mountain.”—Charles de Vich. in his Compend. Chronolog. Exord. et Progressi. Abbé. Claris. B. Marn, de Dunis, fays, Vallem reperit arenarum collibus (quo incolae Duymen vocant) undique circum.

DOWNS are particularly used for a famous road for ships,
ships, along the eastern coast of the county of Kent, from Dover to the North Foreland; where both the outward and homeward-bound ships frequently make some stay; and squadrons of men of war rendezvous in time of war.

It affords excellent anchorage; and is defended by the castles of Deal, Dover, and Sandwich.

DO WRY, the money or fortune which the wife brings her husband in marriage: it is otherwise called matrimonium, marriage-goods, and differs from dowry. See DOVER.

DOXOLOGY, an hymn used in praise of the Almighty, distinguished by the title of greater and lesser.

The lesser doxology was anciently only a single sentence, without repose, running in these words, Glory to the Father, and to the Son, and to the Holy Ghost, world without end. Amen. Part of the latter clause, As it was in the beginning, is now, and ever shall be, was inherent some time after the first composition. Some read this ancient hymn, Glory be to the Father, and to the Son with the Holy Ghost. Others, Glory be to the Father in or by the Son, and by the Holy Ghost.

This difference of expression occasioned no disputes in the church, till the rife of the Arian heresy; but when the followers of Arius began to make use of the latter as a distinguishing character of their party, it was entirely laid aside by the Catholicks, and the use of it was enough to bring any one under suspicion of heterodoxy.

The doxology was used at the close of every solemn office. The western church repeated it at the end of every psalm, and the eastern church at the end of the last psalm. Many of their prayers were also concluded with it, particularly the solemn thanksgiving or consecration prayer at the eucharist. It was also the ordinary conclusion of their sermons.

The greater doxology, or angelic hymn, was likewise of great note in the ancient church. It began with these words, which the angels sang at our Saviour's birth, Glory be to God on high, &c. It was chiefly used in communion service, and in men's private devotions.

Both the doxologies have a place in the church of England, the former being repeated after every psalm, and the latter used in the communion service.

DRABA, in botany: A genus of the filiculofa order, belonging to the tetradyinnae class of plants; and the natural method ranking under the 39th order, Siliculofae. The filica is entire, and oval oblong; with the valves a little plane, parallel to the partition: there is no style. There are six species; of which the only one worthy of notice is the verna, or early white-graff. It hath naked flaks, with leaves a little ferrated. The blossoms are white, and at night the flowers hang down. It grows on old walls and dry banks. It is one of the earliest flowering plants we have, and is good to eat as a salad. Goats, sheep, and horses eat it; cows are not fond of it; swine refuse it.

DRABLER, in the sea-language, a small fail in a ship, which is the same to a bonnet that a bonnet is to a course, and is only used when the course and bonnet are too short to clothe the mast. See Bonnet and Course.

DRABLING, in angling, is a method of catching barbels. Take a strong line of six yards; which, before you fasten it to your rod, must be put through a piece of lead, that if the fish bite, it may drag to and fro, and that the water may something move it on the ground; bait with a lobe worm well secured, and so by its motion the barbel will be enticed into the danger without suspicion. The best places are in running water near piles, or under wooden bridges, supported with oats floated and flimsy.

DRABS, in the gilt-works, a kind of wooden boxes for holding the salt when taken out of the boiling pan; the bottoms of which are made shelving or inclining forwards, that the briny moisture of the salt may drain off.

DRAC, an imaginary being, much dreaded by the country people in many parts of France. The dracs are supposed to be malicious or at least trickish demons; but, which is very rare, if one of them happens to take a fancy to a man or woman, they are sure to be the better for it. They are full paid to lay gold cups and rings on the surface over pits and rivers, as baits to draw women and children in; though their usual dwelling is some old empty house, whence they make excursions in human form, visible or invisible as beft suits their purpose. The country folks flutter at the very name of the drac. Some are positive that they have seen him; for happy indeed is that village in which there is not a house executed as the lurking-place of this tremendous drac.

DRACENA, in botany: A genus of the monogyne order, belonging to the hexandria class of plants. The corolla is 5-partite and erect; the filaments a little thicker about the middle; the berry trilocular and monolperous.

DRACHMA, a Grecian coin, of the value of sevenpence three farthings. Drachm is also a weight used by our physicians; containing just sixty-four grain's three scruples, or the eighth part of an ounce.

DRACO, a celebrated lawgiver of Athens. When he exercised the office of archon, he made a code of laws for the use of his citizens, which, on account of their severity, were said to be written in letters of blood. By them idleness was punished as much more severely as murder, and death was denounced against the one as well as the other. Such a code of rigorous laws gave occasion to a certain Athenian to ask of the legislator, why he was so severe in his punishments? and Draco gave for answer, that as the smallest transgression had appeared to him deserving death, he could not find any punishment more rigorous for more atrocious crimes. These laws were at first enforced, but they were often neglected on account of their extreme severity; and Solon totally abolished them, except that one which punished a murderer with death. The popularity of Draco was uncommon, but the gratitude of his admirers proved fatal to him. When once he appeared on the theatre, he was received with repeated applauses; and the people, according to the custom of the Athenians, showed their respect to their law-giver by throwing garments upon him. This was done in such profusion, that Draco was soon hid under them, and smothered by the too great veneration of his citizens. He lived about 624 years before the Christian era.

DRACO, the DRAGON, in zoology, a genus belonging
DRACO, in anatomy, a constellation of the northern hemisphere: whose stars, according to Ptolemy are 81; according to Tycho, 52; according to Hevelius, 40; according to Bayer, 33; and according to Mr. Flamsteed, 40.

DRACONIFLAMMIS, or dragon-flame, a genus of the gymnofeiria order, belonging to the didynamia class of plants. The root of the corolla is inflated, the upper lip concave. There are 13 species, most of them herbaceous, annual, or perennial plants, from 18 inches to three feet high, garnished mostly with entire leaves, and whorled spikes of small monopetalous and ringent flowers of a blue, white, or purple colour. They are all easily propagated by seeds, which may be sown either in the spring or autumn; from which plants a common kind used for scorbutic eruptions, or with a nitre, or common salt, or with a lixivium of oak-allies, and thereby prevent their forming there again, the usual custom is to wash the parts with wine or vinegar, with alum, nitre, of common salt, or with a strong lixivium of oak-allies, and afterwards anointing them with an ointment of the common kind used for scurvy.

DRACONIANUS, in antiquity, DRAGON-RSARER. Several nations, as the Persians, Parthians, Scythians, &c. bore dragons on their standards; whence the standards themselves were called dracones, ‘dragons.’ The Romans borrowed the same custom from the Parthians; or, as Cusaubon has it, from the Dacæ; or, as Codin, from the Assyrians.

The Roman dracones were figures of dragons painted in red on their flags, as appears from Ammianus Marcellinus; but among the Persians and Parthians they were like the Roman eagles, figures in full relief; so that the Romans were frequently deceived, and took them for real dragons.

The soldier who bore the dragon or standard was called by the Romans draconarius; and by the Greeks δράκων and δράκων, for the emperors carried the custom with them to Constantinople.

DRACONTIC MONTH, the time of one revolution of the moon from her ascending node, called caput draconis, to her return thither.

DRACONIUM, DRAGONS: A genus of the polyanthia order, belonging to the gynandra class of plants; and in the natural method ranking under the first order, Pataeae. The sphaea is cymbiform, or shaped like a boat; the spadix covered all over; there is no calyx; there are five petals; the berries polypetalous. There are five species, all natives of the Indies. The only one which makes any appearance is the pertutum, draconis, with leaves having holes, and a climbing stalk.

DRACUNCULI, in medicine, small long worms which breed in the muscular parts of the arms and legs, called Guinea worms. The common way of getting out these worms is by taking a point of a needle; and to prevent their forming there again, the usual custom is to wash the parts with wine or vinegar, with alum, nitre, or common salt, or with a strong lixivium of oak-allies, and afterwards anointing them with an ointment of the common kind used for scurvy.

DRACUNCULUS, in botany. See ARUM.

DRAG, in building. A door is said to drag when in opening or shutting it hangs or grates upon the floor.

DRAG, in sea-language, is a machine consisting of a sharp, square, iron ring, encircled with a net, and commonly used to take the wheel off from the platform or bottom of the decks.

DRAGOMAN, or DRAGMAN, a term of general use through the East for an interpreter, whose office is to facilitate commerce between the orientals and occidentals. Thesee are kept by the ambassadors of Christian nations residing at the Porte for this purpose.

The word is formed from the Arabic turgeman or turgemn, of the verb turgem, "he has interpreted." From dragenman the Italians formed dragoman, and, with a nearer relation to its Arabic etymology, turgueman; whence the French and otrargueman, as well as dragman and dragoman.

DRAGON, in astronomy. See DRACO.

DRAGONS Head and Tail (caput & cauda draconis); are the nodes of the planets; or the two points where-in the ecliptic is intersected by the orbits of the planets, and particularly that of the moon; making with it angles of five degrees and eighteen minutes. Of these points looks northward; the moon beginning then to have northward latitude, and the other southward, where the commences south. Thus her deviation from the ecliptic seems (according to the fancy of some) to make a figure like to that of a dragon, whose belly is where she has the greatest latitude; the inter-
DRAGON. A section representing the head and tail, from which resemblance the denomination arises.

But note, that these points abide not always in one place, but have a motion of their own in the zodiac, and retrograde-wife 3 minutes per day; completing their circle in 18 years 225 days: so that the moon can be but twice in the ecliptic during her monthly period, but at all other times she will have a latitude or declination from the ecliptic.

It is about these points of intersection that all eclipses happen. They are usually denoted by these characters ♉ dragon's head, and ♊ dragon's tail.

DRAGON, in zoology. See Draco.

DRAGON'S BLOOD, a gummi-resinous substance brought from the East Indies, either in oval drops wrapped up in flag leaves, or in large masses composed of smaller tears. It is said to be obtained from the palmjuncus draco, the calamus rotang, the dracaena draco, the pierocarpus draco, and several other vegetables.

The writers on the materia medica in general give the preference to the former, though the others are not unfrequently of equal goodness. The fine dragon's blood of either sort breaks smooth, free from any visible impurities, of a dark red colour, which changes upon being powdered into an elegant bright crimson. Several artificial compositions, coloured with the true dragon's blood, or Brazil wood, are sometimes sold in the room of this commodity. Some of these diffuse like gums in water; others crackle in the fire without proving inflammable; whilst the genuine fungus dragons readily melts and catches flame, and is not acted on by watery liquors. It totally dissolves in pure spirit, and tinges a large quantity of the menstruum of a deep red colour. It is likewise soluble in expressed oils, and gives them a red hue, lends beautiful tints to the wine, and comminicated by anhufa. This drug in substance has no sensible smell or taste; when dissolved, it discovers some degree of warmth and pungency. It is usually, but without foundation, looked upon as a gentle astringent; and sometimes directed as such in excrementoraneous prescription against seminal gleet, the flor trifolii, and other fluxes. In these cases, it is supposed to produce the general effects of resinous bodies, lightly incrassating the fluids, and somewhat strengthening the solids. But in the present practice it is very little used either externally or internally.

A solution of dragon's blood in spirit of wine is used for staining marble, to which it gives a red tinge, which penetrates more or less deeply according to the heat of the marble during the time of application. But as it spreads at the same time that it fluxes deep, for fine designs the marble should be cold. Mr du Fay says, that by adding pitch to this solution the colour may be rendered deeper.

DRAGON-FISH, or Dragonet, in ichthyology. See Collignonius.

DRAGON-FLY. See Lybellula.

DRAGON-SHELL, in natural history, a name given by people curious in shells to a species of concametered patellae or limpet. This has a top very much bent; and is of an ash-colour on the outside, but of an elegant and bright flesh-colour within. This has been found sticking on the back of a tortoise, as the common limpets do on the sides of rocks; and some have been found affixed to large shells of the pinna marina. Dragon-shells brought from the East Indies at different times.

DRAGONS, in botany. See Dragonetium.

DRAGONET, or Dragon-fish, in ichthyology. See Collignonius.

DRAGONNEE, in heraldry. A lion dragonnee is where the upper half resembles a lion, the other half going off like the hinder part of a dragon. The name may be said of any other beast as well as a lion.

DRAGOON, in military affairs, a mufquito mounted on horseback, who sometimes fights or marches on foot, as occasion requires.

Menage derives the word dragon from the Latin draconarius, which in Vegetius is used to signify foal. But it is more probably derived from the German dragen or dragen, which signifies to carry; as being infantry carried on horseback.

Dragoons are divided into brigades as the cavalry; and each regiment into troops; each troop having a captain, lieutenant, cornet, quarter-master, two sergeants, three corporals, and two drums. Some regiments have hautboys. They are very useful in any expedition that requires dispatçh: for they can keep pace with the cavalry, and do the duty of infantry: they encamp generally on the wings of the army, or at the pales leading to the camp; and sometimes they are brought to cover the general's quarters: they march in the front and rear of the army.

The first regiment of dragoons raised in England was in 1681, and called the regiment of dragoons of North Britain. In battle or attacks they generally fight sword in hand after the first fire. Their arms are, a sword, firelock, and bayonet. In the French service, when the dragoons march on foot, their officers bear the pike and the sergeant the halbert, neither of which are used in the English service.

DRAGOONING, one of the methods used by Papists for converting refractory heretics, and bringing them within the pale of the true church.

The following method of dragooning the French Protestants, after the revocation of the edict of Nantes, under Louis XIV, is taken from a French piece, translated in 1686.

The troopers, soldiers, and dragoons went into the Protestants houses, where they marred and defaced their household stuff, broke their looking-glasses, and other utensils and ornaments, let their wine run about their cellars, and threw about their corn and spoil of any kind. And as to those things which they could not destroy in this manner, such as furniture of beds, linen, wearing apparel, plate, &c. they carried them to the market-place, and sold them to the Jesuits and other Roman catholics. By these means the Protestants in Montaubon alone were, in four or five days, stripped of above a million of money. But this was not the worst.

They turned the dining-rooms of gentlemen into stables for their horses; and treated the owners of the houses where they quartered with the highest indulgence and cruelty, lashing them about from one to another, day and night, without intermission, not suffering them to eat or drink; and when they began to sink under the fatigue and pains they had undergone, they laid them on a bed, and when they thought them some-
somewhat recovered, made them rife, and repeated the
fame tortures. When they saw the blood and sweat
run down their faces and other parts of their bodies,
they fl Created them with water, and putting over their
heads knife-blades, turned these down, they made
a continual din upon them till these unhappy crea-
tures loft their fenfes. When one party of these tor-
mentors were weary, they were relievèd by another,
who practiced the fame cruelties with fresh vigour.

At Negrepliése, a town near Montauban, they
hung up Isaac Favin, a Protestant citizen of that
place, by his arm-pits, and tormentèd him a whole
night, by pinching and tearing off his flefh with pin-
chers. They made a great fire round a boy of about 12
years old, who, with hands and eyes lifted up to heav en,
cried out, "My God, help me!" And when they
found the youth resolved to die rather than renounce
his religion, they burned him from the fire just as he
was on the point of being burnt.

In several places the soldiers applied red-hot irons
to the hands and feet of men and breasts of women.
At Nantes they hung up several women and maidens
by their feet, and others by their arm-pits, and thus
exposed them to public view stark naked. They bound
to posts mothers that gave suck, and let their
infants lie languishing in their arms with ropes, and plunged them again and again
into wells; they bound others by their feet, and others by their arm-pits, and tormented them a whole
night, by pinching and tearing off his fearful death.

Amidst soldiers and men of blood, they applied red-hot irons
and pins, and made them stare exceeding raw and sore. When all
these cruelties could not shake her constancy, they
fastened her by her feet in a kind of gibbet, and let
her hang in that posture, with her head downward,
till the expired.

"The other is of a man in whose house were quartered
some of these militiamen dragoons. One day,
having drunk plentifully of his wine, and broken their
plates at every breath, they filled the floor with the
fragments, and by often walking over them reduced
to very small pieces. This done, in the inftance
matters, they resolved on a dance, and told
their Protestant host that he must be one of their
company; but as he would not be of their religion, he
must dance quite barefoot; and thus barefoot
they drove him about the room, treading on the sharp points
of the broken glases. When he was no longer able
to stand, they laid him on a bed, and, in a short time,
stripped him stark naked, and rolled him from one
end of the room to the other, till every part of his
body was full of the fragments of glass. After this
they dragged him to his bed, and having lent for a
fear, obliged him to cut the pieces of glass with his
instruments, thereby putting him to the most ex-
quise and horrible pains that can possibly be conceived.

"These, fellow Protestants, were the methods
used by the most Christian king's apostolic dragoons
to convert his heretical subjects to the Roman catholi-
c faith! These, and many other of the like nature,
were the torments to which Louis XIV. delivered
them over to bring them to his own church! and as
popery is unchangeably the same, there are the tor-
tures prepared for you, if ever that religion should
be permitted to become settled amongst you; the con-
ideration of which made Luther say of it, what every
man that knows any thing of Christianity must agree
with him in, "If you had no other reason to go out
of the Roman church, this alone would suffice, that
you see and hear, how, contrary to the law of God,
they shed innocent blood. This single circumstance
shall, God willing, ever separate me from the papacy.
And if I was now subject to it, and could blame no-
thing in any of their doctrines; yet for this crime
of
DRAGS, in the sea-language, are whatever hangs over the ship in the sea, as hirts, coats, or the like, and boats, when towed, or whatever else that after this manner may hinder the ship's way when the falls, are called drags.

DRAINS, a name given, in the fen countries, to certain large cuts or ditches of 20, 30, 40, or 50 feet wide, carried through the marly ground to some river or other place capable of discharging the water they carry out of the fen-lands.

An effectual method of drawing off the water from such grounds as are hurt by springs oozing out upon them (usually distinguished by the name of wet or spouting ground, or bog), has been a dehderatum in agriculture. Mr. Anderson is almost the only person who has treated this matter scientifically, and his observations seem to be very rational and well founded.

Springs (says he) are formed in the bowels of the earth, by water percolating through the upper strata where that is of a porous texture, which continues to descend downwards till it meets with a stratum of clay that intercepts it in its course; where, being collected in considerable quantities, it is forced to seek a passage through the porous strata of sand, gravel, or rock, that may be above the clay, following the course of these strata till they approach the surface of the earth, or are interrupted by any obstacle which occasions the water to rise upwards, forming springs, bogs, and the other phenomena of this nature; which being variously diversified in different circumstances, produce that variety of appearances in this respect that we often meet with.

This being the case, we may naturally conclude, that an abundant spring never need be expected in any country that is covered to a great depth with sand without any stratum of clay to force it upwards, as is the case in the sandy deserts of Arabia, and the immeasurable plains of Lybia: neither are we to expect abundant springs in any soil that confiils of an uniform bed of clay; for it must always be in some porous stratum that the water flows in abundance; and it can be made to flow horizontally in that, only when it is supported by a stratum of clay, or other substance that is equally impermeable by water. Hence the rationale of that rule fo universally established in digging for wells, that if you begin with sand or gravel, &c. you need seldom hope to find water till you come to clay; and if you begin with clay, you can hope for none in abundance till you reach to sand, gravel, or rock.

It is necessary that the farmer should attend to this point of nature with care, as his success in draining bogs, and every species of damp and spouting ground, will in a great measure depend upon his thorough knowledge of this,—his acuteness in perceiving in every case the variations that may be occasioned by particular circumstances, and his skill in varying the plan of his operations according to these. As the variety of cafes that may occur in this respect is very great, it would be a very tedious task to enumerate the whole, and describe the particular method of treating each; I shall therefore content myself with enumerating a few particular cases, to flow in what manner the principles above established may be applied to practice. 

"Let fig. 1. represent a perpendicular section of Plate a part of the earth, in which AB is the surface of the ground, beneath which are several strata of porous substances which allow the water to sink through them till it reaches the line CD, that is supposed to represent the upper surface of a solid bed of clay; above which lies a stratum of rock, sand, or gravel. In this case, it is plain, that when the water reaches the bed of clay, and can sink no farther, it must be there accumulated into a body; and seeking for itself a passage, it flows along the surface of the clay, among the sand or gravel, from D towards C; till at last it issues forth, at the opening A, a spring of pure water.

If the quantity of water that is accumulated between D and C is not very considerable, and the stratum of clay approaches near the surface; in that case, the whole of it will issue by the opening at A, and the ground will remain dry both above and below it. But, if the quantity of water is so great as to raise it to a considerable height in the bed of sand or gravel, and if that stratum of sand is not discontinued before it reaches the surface of the ground, the water, in this case, would not only issue at A, but would likewise ooze out in small streams thro' every part of the ground between A and C; forming a barren patch of wet sandy or gravelly ground upon the side of a declivity, which every attentive observer must have frequently met with.

"To drain a piece of ground in this situation is perhaps the most unprofitable task that a farmer can engage in; not only because it is difficult to execute, but also because the soil that is gained is but of very little value. However, it is luckily that patches of this kind are seldom of great breadth, although they sometimes run along the side of a declivity in a horizontal direction for a great length. The only effectual method of draining this kind of ground, is to open a ditch as high up as the highest of the springs at a, which should be of such a depth as not only to penetrate through the whole bed of sand or gravel, but also to sink so far into the bed of clay below, as to make a canal therein sufficiently large to contain and carry off the whole of the water. Such a ditch is represented by the dotted lines a e: but as the expense of making a ditch of such a depth as this would suppohe, and of keeping it afterwards in repair, is very great, it is but in very few cafes that this mode of draining would be advisable; and never, unless where the declivity happens to be so small, that a great surface is lost for little depth, as would have been the case here if the surface had extended in the direction of the dotted line a d.

"But supposing that the stratum of clay, after approaching toward the surface at A, continued to keep at a little depth below ground: and that the soil which lay above it was of a sandy or spongy nature, so as to allow the water to penetrate it easily; even supposing the quantity of water that flowed from D to C was but very inconsiderable, instead of rising out at the spiring A, it would flow forward along the surface of the clay among the porous earth that forms the soil, fo as to keep it constantly drenched with water, and of consequence render it of very little value.

"Wetness
Drains.

"Wetness arising from this cause, is usually of much greater extent than the former: and, as it admits of an easy cure, it ought not to be one moment delayed; as a ditch of a very moderate depth opened at $A$, and carried through a part of the stratum of clay (as represented by the dotted lines $A$ & $f$), would intercept and carry off the whole of the water, and render the field as dry as could be devised. It is, therefore, of very great consequence to the farmer, accurately to distinguish between these two cases, so nearly allied to each other in appearance; and, as this can be effectually done by boring, every one who has much ground of this kind ought to provide himself with a set of boring-irons, which he will likewise find useful for other occasions.

"I might here enumerate a great variety of cases which might be reduced to the same head with the foregoing; but as any attentive reader may, after what has been said, be able easily to distinguish these, I shall only in general observe, that every soil of a soft and porous texture, that lies upon a bed of hard clay, wherever its situation in other respects may be, will in some measure be subjected to this disease. And if it is upon a declivity of any considerable length, the undermost parts of the field will be much damaged by it, unless ditches are thrown across the declivity at $A$ and $r$, so nearly allied to each other in appearance; and, as this can be effectually done by boring, every one who has much ground of this kind ought to provide himself with a set of boring-irons, which he will likewise find useful for other occasions.

"I might here enumerate a great variety of cases which might be reduced to the same head with the foregoing; but as any attentive reader may, after what has been said, be able easily to distinguish these, I shall only in general observe, that every soil of a soft and porous texture, that lies upon a bed of hard clay, wherever its situation in other respects may be, will in some measure be subjected to this disease. And if it is upon a declivity of any considerable length, the undermost parts of the field will be much damaged by it, unless ditches are thrown across the declivity at proper distances from one another, to intercept the water in its descent.

"It may not likewise be improper here to observe, that in cases of this nature, unless where the soil is of a very great depth, the malady will always be increased by raising the ridges to a considerable height; as will appear evident by examining fig. 2, in which the line $A B$ represents the surface of a field of this nature, and $C D$ the surface of the bed of clay. Now, if this field were raised into high ridges, as at $F F$, so that the furrows $E E E$ descended below the surface of the clay, it is plain, that all the water that should sink through the middle of the ridge, would run along the surface of the clay till it came to the sides of the ridge $L L L L L L$, which would thus be kept continually soaked with water. Whereas, if the ground had been kept level, as in the part of the field from $G$ to $H$, with open furrows $H$, at moderate distances from each other, the water would immediately sink to the clay, and be carried off by the furrows, so as to damage the soil far less than when the ridges are high. If the soil is so thin as that the plough can always trench the clay, the ridges ought to be made narrow and quite flat, as from $G$ to $H$: but if there is a little greater depth of soil, then it ought to be raised into ridges of a moderate height, as from $H$ to $B$, so as to allow the bottom of the furrow to reach the clay: but neither is this necessary where the soil is of any considerable depth.

"I have seen some industrious farmers, who having ground in this situation, have been at the very great expense of making a covered drain in each furrow. But, had they rightly understood the nature of the disease, they never would have thought of applying such a remedy; as much appear more fit for the use of those who examine the figure. The success was what might be expected from such a foolish undertaking.

"These observations, it is hoped, will be sufficient as to the manner of treating wet, sandy, or porous soils,

I now proceed to take notice of such as are of a stiff clayey nature, which are often very different in appearance, and require a different treatment from these.

"Suppose that (in fig. 3.) the stratum of sand or gravel $D C$ should be discontinued, as at $E$, and that the stratum above it should be of a coherent clayey nature. In this case, the water that flowed towards $E$, being there pent in on every side, and being accumulated there in great quantities, it must at length force a passage for itself in some way; and permeating strongly upon the upper surface, if any one part is weaker than the rest, it would burst forth and form a spring, (as suppose at $A$). But if the texture of every part of this stratum were equally strong, the water would squeeze thro' many small caverns, and would ooze out in numberless places, as between $A$ and $r$, so as to occasion that kind of wetness that is known by the name of a spouting clayey soil.

"The cure in this case, is much more easily effected than in any of the former; for if a ditch of a considerable size is opened, as at $A$, towards the lowest, or lowest part of the ground, so deep as to penetrate through the upper stratum of clay, as well as to the gravel, the water will rise up through it at first with very great violence, which will gradually decrease as the pressure from the water behind is diminished; and when the whole of the water accumulated in this subterraneous reservoir is run off, there being no longer any pressure upon the clay above it, the whole soon becomes as dry as could be devised, and continues so ever afterwards, if the ditch is always kept open. This I speak from experience, I having rendered some fields of this kind that were very wet, quite dry by this method of treating them.

"It will hardly be necessary for me here to put the farmer upon his guard, to be particularly careful in his observations, that he may distinguish between the wetness that is produced from this cause, and that which proceeds from the cause before mentioned; because the treatment that would cure the one would be of no use at all to the other. The attentive observer likewise will readily perceive, that if any field that is wet from this cause admits of being ploughed, it will be in equal danger of being hurt by being raised into high ridges, with the other kind of damp ground before mentioned. For as the depth of earth above the reservoir would be smaller in the deep furrows than any where else, there would, of consequence, be less resistance to the water in that place, so that it would arise there in greater abundance. And if, in this case, a farmer should dig a drain in each furrow, as a considerable quantity of water would rise into them, in some cases, the ground might be improved, or even quite drained thereby, especially if they should have accidentally reached the gravel in any one place; although at an expense much greater than was necessary. I take notice of this circumstance in some measure to prevent the prejudice that some inattentive observers might entertain against what was said before of this method of draining, from their having accidentally seen some fields that may have been better at first sight to those who examine the figure. The success was what might be expected from such a foolish undertaking.

"These observations, it is hoped, will be sufficient as to the manner of treating wet, sandy, or porous soils,
Into it; but when it is long drenched with it, the surface loses its firmness of texture and consistence; and becomes a sort of semi-fluid mass, which is called a bog; and as these are sometimes covered with a strong secur of a particular kind of grafs, with very matted roots, which is strong enough to bear a small weight without breaking, although it yields very much, it is in these circumstances called a swamp or gravel. But, whatever be the nature of the bog, it is invariably occasioned by water being forced up through a bed of clay, as just now described, and dissolving or softening, if you will, a part thereof. I say only a part; because whatever may be the depth of the bog or swamp, it generally has a partition of solid clay between it and the refervoir of water under it, from whence it originally proceeds: for if this were not the case, and the quantity of water were considerable, it would meet with no sufficient resistance from the bog, and would flow through it with violence, and carry the whole semi-fluid mass along with it. But this would not only be injurious to the bog, but if there was a crust at the bottom of the bog, and if that crust should ever be broken, especially if the quantity of water under it were very considerable: and as it is probable, that, in many cases of this fort, the water flows more and more of this under-crust, I make no doubt, that, in the revolution of many ages, a great manyruptions of this kind may have happened, although they may not have been deemed of importance enough to have the history of them transmitted to posterity. Of this kind, although formed of a different substance, I consider the flow of the Solway-mofs in Northumberland to have been; which, upon the 16th of November 1771, burst its former boundaries, and poured forth a prodigious stream of semi-fluid matter, which in a short time covered several hundred acres of very fine arable ground. Nor will any one, who is acquainted with the nature of mofs,—who knows its resemblance to clay in its quality of absorbing and retaining water, and its very easy diffusibility therein be surprised at this; as, from all these properties, it is much better adapted for forming an extensive bog, and therefore in greater danger of breaking up and concurring by atomical evaporation the diffusion of the water into it, than those that are formed of any kind of clay whatever.

"If the bog, or swampy ground, is upon a declivity, the ditch ought to be carried across the field about the place where the lowest springs arise. But if the surface of the ground is level, or nearly so, as between A and B, and the springs break out in several places, so as to form soft quagmires interpersed through the whole of the field, it will be of little consequence in what part the drain is opened; for if it is dug up so deep as to allow the water to rise in it with freedom, it will illude through that opening, and the field will be left perfectly dry. But as it may frequently happen that the stratum or gravel should be at a considerable depth beneath the surface of the earth, and as it may be sometimes even below the level of the place into which the drain must be emptied, it might sometimes be extremely difficult to make a ditch so deep as to reach the bed of sand or gravel. But it is lucky for us that this is not absolutely necessary in the present case; as a drain of two or three feet deep, as at D, will be equally effectual with one that should go to the gravel. All that is necessary in this case, is to sink pits (P) in the course of the drain, at a moderate distance from one another which go to deep as to reach the gravel; for as the water there meets with no resistance, it readily flows out at these openings, and is carried off by the drain without being forced up through the earth; so that the ground is left entirely dry ever after."

"I have likewise drained several fields in this way; and as I have generally found the appearances pretty much alike, I shall, for the information of the inexperienced reader, give a short account of them."

"If you attempt to make your pit in one of those soft quaggy places where the water is found in great abundance, you will meet with very great difficulty in forming it; for as the substance of which it is composed is soft, it will always flow into the hole as fast as you dig it; on which account I would advise, not to attempt to make the pit in the quagge, but as near it as you conveniently can. However, if it is pretty firm, and of no great extent, it is sometimes practicable to make a pit in the soft bog at the driest height of the year. This I have sometimes practiced, which gave me an opportunity of observing the nature of these bogs more perfectly than I otherwise would have had. In the trials of this kind that I have made, this soft quaggy ground has seldom been above three or four feet deep, below which I have always found a stratum of hard tough clay usually mixed with stones; and so firm, that nothing but a mattock or pick-axe could penetrate it: and as this is comparatively so much drier than the ground above it, an inexperienced operator is very apt to imagine that this is the bottom that he is in search of. In digging thro' this stratum, you will frequently meet with small springs oozing out in all directions; some of them that might fill the tube of a small quill, and others so small as to be scarce perceptible: but without regarding these, you must continue to dig on without interruption till you come to the main body of the refervoir, if I may so call it, that is contained in the rock, gravel, sand, and which you will generally find from two to four feet below the bottom of the quagge, and which you will be in no danger of mistaking when you come to it: for, if there has been no opening made before that in the field, as soon as you break the crust immediately above the gravel or rock, the water bursts forth like a torrent, and on some occasions rise like a jet d'eau, to a considerable height above the bottom of the ditch; and continues to flow off with great impetuosity for some time, till the pent-up water being drained off, the violent boiling up begins to subside, and the strength of the current to abate; and, in a short time, it flows gently out like any ordinary spring,—allowing it to remain in this state, the quaggy earth begins to subside and gradually becomes firmer and firmer every day; so that, in the space of a few months, those bogs which were formerly so soft as hardly to support the weight of a small dog, become so firm, that oxen and horses may tread upon them without any danger of sinking, at the very wettest season of the year. I have had a field of this nature, that by having only one such pit as I have now described opened in it, was entirely drained to the distance of above a hundred yards.
moist and full of water during the winter season; but when the dry weather of summer sets in, the moisture is diminished, and the surface becomes hard, and it is rent into many large gaps which allow free admission to the sun and air, so as to scour up almost every plant that is sowed upon it; and as these soils are usually in themselves naturally fertile when drained, it were to be wished that some method could be discovered that would be less expensive than what is usually practised with regard to some soils of this kind in Eifex; where they make covered drains of two and a half feet deep, running diagonally through the whole field, at the distance of 20 feet from each other.

Concerning the making of these drains we have the following directions in the Georgical Essays, by T. B. Bayley, Esq.; of Hope near Manchester. — First, make the main drains down the slope or fall of the field. When the land is very wet, or has not much fall, there should, in general, be two of these to a statute acre; for the shorter the narrow drains are, the less liable they will be to accidents. The width of the trench for the main drains should be 30 inches at top, but the width at the bottom must be regulated by the nature and size of the materials intended to be used. If the drain is to be made of bricks 10 inches long, 3 inches thick, and 4 inches in breadth, then the bottom of the drain must be 12 inches; but if the common flat bricks are used, then the bottom must be proportionately contracted. In both cases there must be an interval of one inch between the bottom brick and the sides of the trench, and the vacuity must be filled up with straw, rushes, or loose mould. For the purpose of making these drains, I order my bricks 19 be moulded 10 inches long, 4 broad, and 3 thick; which dimensions always make the best drain.

"The method I pursue in constructing my main drains is as follows. — When the ground is soft and spongy, the bottom of the drain is laid with bricks placed across. On the other hand, two bricks are laid flat, one upon the other, forming a drain six inches high and four broad; which is covered with bricks laid flat. When the bottom of the trench is found to be a firm and solid body, as clay or marl, the bottom of the drain does not then require being laid with bricks. In that case the sides are formed by placing one brick edgewise, instead of two laid flat.

"This latter method is much cheaper, and in such land equally durable with the other. Where stones are used instead of bricks, the bottom of the drain should be about eight inches in width. And here it will be proper to remark, that, in all cases, the bottom of the main drains must be sunk four inches below the level of the narrow ones, even at the point where the latter fall into them.

"The main drains should be kept open till the narrow ones are begun from them, after which they may be finished; but before the earth is returned upon the stones or bricks, it will be advisable to throw in straw, rushes, or brushwood, to increase the freedom of the drain.

"The small narrow drains should be cut at the distance of 16 or 18 feet from each other; and should fall into the main drain at very acute angles, to prevent any floppage. At the point where they fall in, and eight or ten inches above it, they should be made

firm
Drake.  

Drake (Sir Francis), the renowned English admiral, was the son of Edmund Drake a sailor, and born near Tavistock in Devonshire, in the year 1545. He was brought up at the expense and under the care of Sir John Hawkins, who was his kinsman; and, at the age of 18, was the purser of a ship trading to Bifcay. At 20, he made a voyage to Guinea; and, at 22 had the honour to be made captain of the Judith. In that capacity he was in the harbour of St John de Ulloa, in the gulf of Mexico, where he behaved most gallantly in the glorious actions under Sir John Hawkins, and returned with him to England with great reputation, though not with such advantages as he expected. He made another expedition in 1572, wherein he did the said Spanish some mischief, and gained considerable booties. Upon this he pro­jected a design against the Spaniards in the West Indies; which he no sooner published, than he had volunteers enough ready to accompany him. In 1570, he made his first expedition with two ships; and the next year with one only, in which he returned safe, if not with such advantages as he expected. He made another expedition in 1572, wherein he did the Spaniards some mischief, and gained considerable booties. In these expeditions he was much afflicted by a nation of Indians, whom then were, and have been ever since, engaged in perpetual wars with the Spaniards. The prince of these people was named Pedro; to whom Drake presented a fine cutlass from his fide, which he saw the Indian greatly admired. Pedro, in return, gave him four large wedges of gold; which, however, ran upon a rock, the 9th of January following; from which, beyond all expectation, and in a manner miraculously, they got off, and continued their course. On the 16th of March he arrived at Java, and thence he intended to have directed his course to Malacca; but found himself obliged to alter his purpose, and to think of returning home. On the 25th of March 1580, he put this design in execution; and on the 15th of June he doubled the Cape of Good Hope, having then on board 57 men, and but three casks of water. On the 12th of July he passed the line, reached the coast of Guinea on the 16th, and there watered. On the 11th of September he made the island of Tercera; and on the 3d of November entered the harbour of Plymouth. This voyage round the world was performed in two years and about ten months. Shortly after his arrival, the queen going to Deptford, went on board his ship; and, after dinner, she conferred on him the order of knighthood, and declared her absolute approbation of all he had done. She likewise gave directions for the preservation of his ship, that it might remain a monument of his own and his country's glory. This celebrated ship, which had been contemplated many years at Deptford, at length decaying, it was broke up, and a chair, made out of the planks, was presented to the university of Oxford; up-
In the year 1589, Sir Francis Drake commanded as admiral the fleet sent to restore Don Antonio king of Portugal, the command of the land-forces being given to Sir John Norris: but they were hardly got to sea, before the commanders differed, and so the attempt proved abortive. The war with Spain continuing, a more effectual expedition was undertaken by Sir John Hawkins and Sir Francis Drake, against their settlements in the West Indies, than had hitherto been made during the whole course of it: but the commanders here again not agreeing about the plan, this also did not turn out so successfully as was expected. All difficulties, before these two last expeditions, had given way to the skill and fortune of Sir Francis Drake: which probably was the reason why he did not bear these disappointments so well as he otherwise would have done. A strong sense of this is supposed to have thrown him into a melancholy, which occasioned a bloody flux; and of this he died on board his own ship, near the town of Nombre de Dios in the West Indies, on the 28th of January 1596. His death was lamented by the whole nation, and particularly by his countrymen; who had great reason to love him from the circumstances of his private life, as well as to esteem him in his public character. He was elected burgess for the town of Bosville, alias Tintagel, in the county of Cornwall, in the 27th parliament of queen Elizabeth; and for Plymouth in Devonshire, in the 35th of the same reign. This town had very particular obligations to him: for, in the year 1587, he undertook to bring water into it, through the want of which, till then, it had been grievously distressed: and he performed it by conducing thither a stream from springs at eight miles distance, that is to say, in a straight line: for in the manner he brought it, the course of it runs upwards of 20 miles.

DRAKENBORCH (Arnold), professor of eloquence and history at Utrecht, made himself known by several works, and particularly by his Notes on Titus Livius and Silius Italicus; his fine editions of which are highly esteemed.

DRAMA, a poem containing some certain action, and representing a true picture of human life, for the delight and improvement of mankind.

The principal species of the drama are two, comedy and tragedy. Some others there are of lefs note, as pastoral, satire, tragi-comedy, opera, &c. See the article POETRY.

DRAMATIC, an epithet given to pieces written for the stage. See Poetry.

DRANK, among farmers, a term used to denote wild oats, which never fail to infest worn-out lands; so that, when ploughed lands run to these weeds and thistles; the farmer knows it is high time to follow them, or else to sow them with hay-feed, and make pasturage of them.

DRAPERY, in sculpture and painting, signifies the representation of the clothing of human figures, and also hangings, tapestry, curtains, and most other things that
that are not carnations or landscapes. See Painting, Crayon, Drawing, and Miniature.

DRASTIC, in physic, an epithet bestowed on such medicines as are of present efficacy, and potent in operation; and is commonly applied to emetics and cathartics.

DRAVE, a large navigable river, which, taking its rise in the archbishopric of Salzburg, in Germany, runs south-east through Sizilia; and continuing its course, divides Hungary from Sclavonia, and falls into the Danube at Eckeck.

DRAUGHT, in trade. See Potion.

DRAUGHT, in medicine. See Potion.

Draught, in trade, called also off or close, is a small allowance on weighable goods, made by the king to the importer, or by the seller to the buyer, that the weight may hold out when the goods are weighed again.

The king allows 1 lb draught for goods weighing no less than 1 Cwt. 2 lb for goods weighing between 1 and 2 Cwt. 3 lb for goods weighing between 2 and 3 Cwt. 4 lb from 3 to 10 Cwt. 7 lb from 10 to 18 Cwt. 9 lb from 18 to 30 or upwards.

Draught is also used sometimes for a bill of exchange, and commonly for an order for the payment of any sum of money due, &c. Then the person who gives the order is said to draw upon the other.

Draught, or, as it is pronounced, Draft, in architecture, the figure of an intended building described on paper, wherein are laid down, by scale and compass, the several divisions and partitions of the apartments, rooms, doors, passages, conveniences, &c. in their due proportion.

It is usual, and exceedingly convenient, before a building is begun to be raised, to have draughts of the ichnography, or ground-plan of each floor or story; as also of the form and fashion of each front, with the windows, doors, ornaments, &c. in an orthography, or upright. Sometimes the several fronts, &c. are taken, and represented in the same draught, to show the effect of the whole building; this is called a scenography, or perspective.

Draught, the depth of a body of water necessary to float a ship: hence a ship is said to draw so many feet of water, when she is borne up by a column of water of that particular depth. Thus, if it requires a body of water whose depth is equal to 12 feet, to float or buoy up a ship on its surface, she is said to draw 12 feet water; and that this draught may be more readily known, the feet are marked on the stem and stern post, regularly from the keel upwards.

Draught-hooks, are large hooks of iron, fixed on the cheeks of a cannon-carriage, two on each side, one near the trunnion hole, and the other at the train, distinguished by the name of fore and hind draught-hooks. Large guns have draught-hooks near the middle trunnion, to which are fixed the chains that serve to keep the shafts of the limbers on a march. The fore and hind hooks are used for drawing a gun backwards or forwards, by men with strong ropes, called draught-rope, fixed to these hooks.

Draught-horse, in farming, a sort of coarse-made horse, defined for the service of a cart or plough.

Drawback, in commerce, certain duties, either of the customs, or of the excise, allowed upon the exportation of some home manufactories; or upon certain foreign merchandise, that have paid duty on drawback importation.

In Britain the oaths of the merchants importing and exporting are required to obtain the drawback on foreign goods, affirming the truth of the officers certificate on the entry, and the due payment of the duties; and these may be made by the agent or husband of any corporation or company; or by the known servant of any merchant usually employed in making his entries, and paying his customs. In regard to foreign goods entered outward, if less quantity or value be fraudulently slipped out than what is expressed in the exporter’s certificate, the goods therein mentioned, or their value, are forfeited, and no drawback to be allowed for the same. Foreign goods exported by certificate in order to obtain the drawback, not shipped or exported, or re­landed in Great Britain, unless in case of distress to save them from perishing, are to lose the benefit of the drawback, and are forfeited, or their value, with the vessel, horses, carriages, &c. employed in the re­landing thereof: and the persons employed in the re­landing them, or by whose privy they are re­landed, or into whose hands they shall knowingly come, are to forfeit double the amount of the drawback. Officers of the customs conniving at or aiding in any fraud relating to certificate goods, besides other penalties, are to forfeit their office, and suffer six months imprisonment without bail or main-prize; as are also masters, or persons belonging to the ships employed therein. Bonds given for the exportation of certificate-goods to Ireland must not be delivered up, nor drawback allowed for any goods, till a certificate under the hands and seals of the collector or comptroller, &c. of the customs be produced, testifying the landing.

Draw-bridge, a bridge made after the manner of a float, to draw up or let down, as occasions serve, before the gate of a town or castle. See Bridge.

A draw-bridge may be made after several different ways; but the most common are made with pliers, twice the length of the gate, and a foot in diameter. The inner square is traversed with a cross, which serves for a counterpoise; and the chains which hang from the extremities of the pliers to lift up or let down the bridge, are of iron or brass.

In navigable rivers it is sometimes necessary to make the middle arch of bridges with two moveable platforms, to be raised occasionally, in order to let the masts and rigging of ships pass through. This kind of draw-bridge is represented in Plate CLXV. where A B is the width of the middle arch; A L and B L, the two piers that support the draw-bridge N O, one of the platforms of which is railed, and the other let down, having the beam P Q for its plier. To N O are suspended two moveable braces E H, E H; which resting on the support S, press against the bracket M, and thereby strengthen the draw-bridge. These braces are conducted to the rest by means of the weight S, pulling the chain S L F.

Draw-net, a kind of net for taking the larger sort of wild-fowl, which ought to be made of the best sort of pack-thread, with wide meshes; they should be about two fathoms deep and fix long, verged on each side with a very strong cord, and stretched at each end on long poles. It should be spread smooth and flat upon the ground; and drawed over with grass, hedge,
THE art of representing the appearances of objects upon a plain surface, by means of lines, shades, and shadows, formed with certain materials adapted to the purpose.

§ 1. Of the proper Materials for Drawing, and the Manner of using them.

The first thing necessary for a beginner is to furnish himself with proper materials, such as black-lead pencils, crayons, of black, white, or red chalk, crow-quill pens, a rule and compasses, camels-hair pencils, and Indian ink. He must accustom himself to hold the pencil farther from the point than one does a pen in writing; which will give him a better command of it, and contribute to render the strokes more free and bold. The use of the rule is to draw the first sketches or outlines of the piece, as any stroke or line that is amiss may in this be more easily rubbed out than in any other thing; and when he has made the sketch as correct as he can with the pencil, he may then draw carefully the best outline he has got, with his crow-quill pen and ink (A); after which he may discharge the pencil-lines, by rubbing the piece gently with the crumb of stale bread or India rubber. Having thus got the outline clear, his next work is to shade the piece properly, either by drawing fine strokes with his pen where it requires to be shaded, or by washing it with his pencil and the Indian ink. As to his rule and compasses, they are never or very rarely to be used, except in measuring the proportions of figures after he has drawn them, to prove whether they are right or not; or in houses, fortifications, and other pieces of architecture.

§ 2. Of drawing Lines, Squares, Circles, and other regular and irregular Figures.

Having got all these implements in readiness, the first practice must be to draw straight and curve lines, with ease and freedom, upwards and downwards, sideways to the right or left, or in any direction whatsoever. He must also learn to draw, by command of hand, squares, circles, ovals, and other geometrical figures: for as the alphabet, or a knowledge of the letters, is an introduction to grammar; so is geometry to drawing. The practice of drawing the first simple figures till he is master of them, will enable him to imitate, with greater ease and accuracy, many things both in nature and art. And here it is proper to admonish him, never to be in a hurry; for many things in the matter of one subject, before he proceeds to another; the advantage, and even necessity, of this, will appear as he proceeds. Two observations more may be added: 1. That he accustom himself to draw all his figures very large, which is the only way of acquiring a free bold manner of designing. 2. That he practive drawing till he has gained a tolerable mastery of his pencil, before he attempts to shadow any figure or object of any kind whatever.

§ 3. Of Drawing Eyes, Ears, Legs, Arms, Hands, Feet, &c.

As to the drawing of eyes and ears, legs and arms, the learner will have very little more to do than to copy carefully the examples given in Plate CLXVI. and CLXVII. taken from Sebastian le Clerc's drawing book. But the actions and postures of the hands are so many and various, that no certain rules can be given for drawing them, that will universally hold good. Yet as the hands and feet are difficult members to draw, it is very necessary, and well worth while to bestow some time and pains about them, carefully imitating their various postures and actions, so as not only to avoid all lamenites and imperfections, but also to give them life and spirit. To arrive at this, great care, study, and practice, are requisite; particularly in imitating the best prints or drawings that can be got of hands and feet (some good examples of which are given in Plate CLXVII.); for, as to the mechanical rules of drawing them by lines and measures, they are not only perplexed and difficult, but also contrary to the practice of the best masters. One general rule, however, may be given (which is universally to be observed in all subjects), and that is, Not to finish perfectly at first any single part, but to sketch out faintly, and with light strokes of the pencil, the shape and proportion of the whole hand, with the action and turn of it; and after considering carefully whether this first sketch be perfect, and altering it wherever it is amiss, you may then proceed to the bending of the joints, the knuckles, the veins, and other small particulars, which when the learner has got the whole shape and proportion of the hand or foot, will not only be more easily but also more perfectly designed.

§ 4. Of Drawing Faces.

The head is usually divided into four equal parts.

1. From the crown of the head to the top of the forehead.

2. From the top of the forehead to the eye-brows.

3. From the eye-brows to the bottom of the nose.

4. From thence to the bottom of the chin.

But this proportion is not constant; those features in different men being often very different as to length and shape. In a well-proportioned face, however, they are nearly right. To direct the learner therefore in forming a perfect face, his first business is to draw an oval, or rather the form of an egg; in the middle

(A) The ink made use of for this purpose must not be common, but Indian ink; which is much fatter than the other, and does not run: by mixing it with water, it may be made to any degree of strength, and used in a pen like common ink.
middle of which, from the top to the bottom, draw a perpendicular line. Through the centre or middle of this line draw a diameter line, directly across from one side to the other of your oval. On these two lines all the features of your face are to be placed as follows: Divide your perpendicular line into four equal parts: the first must be allotted to the hair of the head; the second is from the top of the forehead to the middle of which, from the top to the perpendicular line. Through the centre or middle of the nose between the eye-brows; the third is from thence to the bottom of the nose; and the fourth includes the lips and chin. Your diameter line, or the breadth of the face, is always supposed to be the length of five eyes; you must therefore divide it into five equal parts, and place the eyes upon it so as to leave exactly the length of one eye between them. This is to be understood only of a full front face, Plate CLXVI. fig. a; for if it turn to either side, then the distances are to be leften on that side which turns from you, less or more in proportion to its turning, (fig. b b.) The top of the ear is to rise parallel to the eye-brows, at the end of the diameter line; and the bottom of it must be equal to the bottom of the nose. Nose flr not to come out farther than the corner of the eye in any face; and the middle of the mouth must always be placed upon the perpendicular line.

§ 5. Of Drawing Human Figures.

When the learner is tolerably perfect in drawing faces, heads, hands, and feet, he may next attempt to draw the human figure at length. In order to which, let him first sketch the head; then draw a perpendicular line from the bottom of the head seven times its length (for the length of the head is about one-eighth of all the hands). As to the order and manner of proceeding in drawing the human body, he must first sketch the head; then the shoulders in the exact breadth; then draw the trunk of the body, beginning with the arm-pits (leaving the arms till afterwards), and so draw down to the hips on both sides; and be sure he observes the exact breadth of the waist. When he has done this, let him then draw that leg which the body stands upon, and afterwards the other which stands loose; then the arms, and last of all the hands.

He must take notice also of the bowings and bendings that are in the body; making the part which is opposite to that which bends correspond to it in bending with it. For instance: If one side of the body bend in, the other must stand out answerable to it; if the back bend in, the belly must stick out; if the knee bend out, the ham must fall in; and so of any other joint in the body. Finally, he must endeavour to form the true figure of the body, and in just proportion: not one arm or one leg bigger or less than the other; not broad Herculean shoulders, with a thin and slender waist; nor raw and bony arms, with thick and gouty legs: but let there be a kind of harmonious agreement amongst the members, and a beautiful symmetry throughout the whole figure.

Proportions and Measures of the Human body. The centre or middle part, between the two extremes of the head and feet of a new born child, is in the navel, but that of an adult is in the os pubis: and the practice of dividing the measure of children into four, five, or six parts, whereof the head is one, is made use of by painters and sculptors.

A child of two years old has about five heads in its whole length, but one of four or five years old has near six: about the fifteenth or sixteenth years, seven heads are the proportion or measure, and the centre inclines to the upper part of the pubis. Hence it appears, as the growth of the body advances, there is a gradual approach to the proportion of an adult of near eight heads in the whole length, of which, as mentioned above, the head makes one.

Agreeable to these principles, the following Table is constructed, exhibiting the proportions of the parts of a man and a woman, as they were fixed by the ancients, and measured by M. Audran from the Apollo
D R A W I N G.

pollo Pythis (Plate CLXIX.) in the garden of the Vatican at Rome, and the Venus Aphroditus (Plate CLXX.) belonging to the family of the Medicis. Supposing the figures to stand upright and duly poised on both legs, the whole height of the former is divided into 31 parts, being 7 heads 3 parts and 6 minutes; and that of the latter into 31 parts, being 7 heads and 3 parts.

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<tr>
<th></th>
<th>Apollo</th>
<th>Venus</th>
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<td>Hds. Pts. Min.</td>
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<td>0 2 10 0 2 7</td>
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### Length of the Head and Trunk of the Body.

<table>
<thead>
<tr>
<th>From the top of the head to the bottom of the chin</th>
<th>4 parts or</th>
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<tr>
<td>the bottom of the chin to the top of the sternum or breast bone</td>
<td>-</td>
</tr>
<tr>
<td>the top of the sternum to the pit of the stomach</td>
<td>-</td>
</tr>
<tr>
<td>the pit of the stomach to the navel</td>
<td>-</td>
</tr>
<tr>
<td>the navel to the pubis</td>
<td>-</td>
</tr>
</tbody>
</table>

Length of the head and trunk of the body

<table>
<thead>
<tr>
<th></th>
<th>Apollo</th>
<th>Venus</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 3 9</td>
<td>3 3 6</td>
<td></td>
</tr>
</tbody>
</table>

### Length of the Lower Extremities.

<table>
<thead>
<tr>
<th>From the pubis to the small of the thigh above the patella or knee-pan</th>
<th>1 2 6 1 2 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>the small of the thigh to the joint or middle of the knee</td>
<td>0 1 9 0 1 6</td>
</tr>
<tr>
<td>the joint of the knee to the small of the leg above the ankle</td>
<td>1 1 9 1 2 0</td>
</tr>
<tr>
<td>the top to the bottom of the ankle</td>
<td>0 1 0 0 1 0</td>
</tr>
<tr>
<td>the bottom of the ankle to the bottom of the heel</td>
<td>0 0 9 0 0 9</td>
</tr>
</tbody>
</table>

Length of the lower extremities

<table>
<thead>
<tr>
<th>Length of the head and trunk, as above</th>
<th>-</th>
</tr>
</thead>
</table>

| Total length of the figures | 7 3 6 7 3 0 |

### Length of the Fore-Arm or Upper Extremities.

<table>
<thead>
<tr>
<th>From the top of the shoulder to the elbow</th>
<th>1 2 3 1 2 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>the elbow to the hand</td>
<td>1 1 2 1 0 6</td>
</tr>
<tr>
<td>the joint of the hand to the root of the middle finger</td>
<td>0 1 8 0 1 6</td>
</tr>
<tr>
<td>the root to the tip of the middle finger</td>
<td>0 1 10 0 1 7</td>
</tr>
</tbody>
</table>

Length of the upper extremities

<table>
<thead>
<tr>
<th>Breadth between the outward angles of the eyes</th>
<th>3 2 1 1 3 1 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>of the face at the temples</td>
<td>-</td>
</tr>
<tr>
<td>of the upper part of the neck</td>
<td>-</td>
</tr>
<tr>
<td>over the shoulders</td>
<td>-</td>
</tr>
<tr>
<td>of the body below the arm-pits</td>
<td>-</td>
</tr>
<tr>
<td>between the nipples</td>
<td>1 1 0 0 1 8</td>
</tr>
<tr>
<td>from the bottom of the chin to the horizontal line of the nipples</td>
<td>1 1 7 1 0 1</td>
</tr>
<tr>
<td>of the body at the small of the waist</td>
<td>1 1 0 1 8</td>
</tr>
<tr>
<td>over the loins or os ilium</td>
<td>1 1 3 1 1 6</td>
</tr>
<tr>
<td>over the haunches or tops of the thigh-bones</td>
<td>1 1 5 1 2 3</td>
</tr>
<tr>
<td>of the thigh at the top</td>
<td>-</td>
</tr>
<tr>
<td>of the thigh below the middle</td>
<td>-</td>
</tr>
<tr>
<td>of the thigh above the knee</td>
<td>-</td>
</tr>
<tr>
<td>of the leg below the knee</td>
<td>-</td>
</tr>
<tr>
<td>at the calf of the leg</td>
<td>-</td>
</tr>
<tr>
<td>below the calf</td>
<td>-</td>
</tr>
<tr>
<td>above the ankle</td>
<td>-</td>
</tr>
<tr>
<td>of the ankle</td>
<td>-</td>
</tr>
<tr>
<td>below the ankle</td>
<td>-</td>
</tr>
<tr>
<td>middle of the foot</td>
<td>-</td>
</tr>
<tr>
<td>at the roots of the toes</td>
<td>-</td>
</tr>
<tr>
<td>of the arm over the biceps muscle</td>
<td>-</td>
</tr>
<tr>
<td>of the arm above the elbow</td>
<td>-</td>
</tr>
<tr>
<td>of the arm below the elbow over the long supinator</td>
<td>-</td>
</tr>
<tr>
<td>at the wrist</td>
<td>-</td>
</tr>
<tr>
<td>of the hand over the first joint of the thumb</td>
<td>-</td>
</tr>
<tr>
<td>of the hand over the roots of the fingers</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Breadth</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Breadth over the heads of the scapulae or shoulder blades.
Length of both arms and hands, each of the Apollos being 3 h. 2 p. 11 m. and the Venus 3 h. 1 p. 5 m.

Breadth between the tips of the middle fingers of each hand when the arms are stretched out horizontally.

SIDE VIEW.

Length from the top of the head to the shoulder
from the top of the shoulder to the loins above the hip
from the loins to the lower part of the hip
from the hip to the side of the knee, opposite to the top of the patella
from the side of the knee to the bottom of the heel

Length of the figures

Thicknees from the fore to the back part of the skull
from the wing of the nose to the tip of the ear
of the upper part of the neck
from the breast to the back over the nipples
from the belly to the small of the back
from the belly above the navel to the back of the loins
from the bottom of the belly to the round of the hip
from the forepart of the thigh to the bottom of the hip
of the thigh at the middle
of the thigh above the knee
at the middle of the knee below the patella
of the leg below the knee
of the leg at the calf
of the leg at the ankle
of the foot at the thickest part
length of the foot
from the forepart of the bend of the foot to the lower and back part
of the heel
of the arm over the biceps
over the elbow
below the elbow
at the wrist
below the joint of the wrist
of the hand at the roots of the fingers
at the roots of the nails

The other most admired antique statues differ a little from these proportions, the Laocoön measuring 7 h. 2 p. 3 m. the Hercules 7 h. 3 p. 7 m. the Pyramus 7 h. 2 p. the Antinous 7 h. 2 p. the Grecian shepherd 7 h. 3 p. 6 m. and the Mirmillo 8 h. But all their other proportions are allowed to be harmonious and agreeable to the characters of the figures they represent.

The most remarkable differences of the symmetry or proportions of a man and of a woman to be observed from the Table are: First, the shoulders of a man are broader, measuring two heads; and the haunches narrower, measuring 1 h. 1 p. 5 m. whereas the shoulders of a woman measure only 1 h. 3 p. 8 m. and the haunches measure 1 h. 2 p. 3 m. The sternum or breast bone of a man is longer, measuring 3 p. 8 m. and the sternum of the woman only 3 p. 3 m. On the contrary, the pelvis of a man is less, measuring from the top to the bottom only 4 p. whereas the pelvis of a woman measures from the top to the bottom 4 p. 3 m.

It is a leading principle, in which every person conversant in designing has agreed, that without a perfect knowledge of the proportions, nothing can be produced but monstrous and extravagant figures; and it is also universally admitted, that the ancient Greek and Roman sculptors attained the highest success in producing the most perfect models. The greatest of the modern artists who have examined their figures with attention, admit, that several of the ancient sculptors in some degree have excelled nature, they never having found any man so perfect in all his parts as some of their figures are. Their opportunities indeed were great; Greece abounded with beauties; and Rome being mistress of the world, every thing that was curious and beautiful was brought to it from all parts. Their motives were also powerful; religion, glory, and interest. They considered it as a kind
kind of religious worship to give the figures of their
gods so much nobleness and beauty as to be able to
attract the love and veneration of the people. Their
own glory was also concerned, particular honours be-
being bestowed on those who succeeded; and for their
fortune they had no further care to take when they
once arrived at a certain degree of merit.

Attitudes and Action of the Muscles. If a strong per-
son is to be represented in a vigorous action, such as
Hercules, &c. after a suitable proportion to such a figure
and the action is designed, the parts or limbs employ-
ed in the chiefest force of the action ought to be con-
sidered. If the figure is standing, the foot must be
placed in a right line, or perpendicular to the trunk
or bulk of the body, where the centre of gravity may
be placed in aquilibrio. This centre is determined
by the heel; or, if the figure is upon tiptoe, then the
ball of the great toe is in the centre. The muscles of
the leg which supports the body ought to be swel-
ed, and their tendons drawn more or less than those of the other leg, which is only placed so as to receive the weight of the body towards that way to
which the action inclines it. For example, suppose
Hercules with a club striking at any thing before him
between the left side: Then let his right leg be placed
so as to receive the whole weight of the body, and the
left solely touching the ground with its toes. Here the
external muscles of the right leg ought to be expressed
very strong; but those of the left scarcely appearing
more than if it were in some sedentary posture, except
in the present case. The foot being extended, the
muscles which compose the calf of the leg are in action
and appear very strong; though it is not meant that all
the muscles of the right leg, which support the weight
of the body, ought to be expressed very strong or equally
swelled, but those most prominent which are chiefly con-
cerned in the action or posture that the leg is then in.
For example, if the leg or tibia is extended, then the
extending muscles placed on the thigh are most swel-
ed; the femur then being bent, the external muscles of
their tendons appear most. The like may be observed of
the whole body in general when it is put into vigorous
action. The Laocoon in the Vatican garden at Rome
furnishes an example of this muscular appearance
through the whole; but in the Antinous, Apollo, and
other figures of the ancients, in the Vatican and other
places, in postures where no considerable actions are
designed, we see their muscles expressed but faintly,
or scarcely appearing.
The clavicles or collar bones, and muscles in general,
do not appear in women as in men; nor will any action
in which a woman uses her utmost strength occasion
that swelling or risings of the muscles to appear as
they do in men, since the great quantity of fat placed
under the skin of women so clothes their muscles, &c.
as to prevent any such appearances.

Effects of the Exertion of the Muscles. The follow-
ing are the most obvious effects of the exertion of fe-
veral of the muscles; of those, to wit, which chiefly
demand the attention of an artist.

If either of the malfoid muscles (Plate CLXXI.
1. 7.) act, the head is turned to the contrary side, and
the muscle which performs that action appears very
plain under the skin.

If the arms are lifted up, the deltoid muscles placed
on the shoulders, which perform that action, swell,
and make the extremities of the spines of the shoulder-
blades (Plate CLXXII. 3. 3.) called the tops of the
shoulders, appear indented or hollow.
The shoulder-blades following the elevation of the
arms, their bases (Plate CLXXII. 4. 4.) incline at
that time obliquely downward.

If the arms are drawn down, put forwards, or pulled
backwards, the shoulder-blades necessarily vary their
positions accordingly. All these particulars are to be
learned by consulting the life only; when being well
acquainted with what then appears in every action, the
artist will be able to form an adequate idea how it ought
to be expressed. These circumstances are little known;
hence seldom attended to in designing.

When the cubit or fore-arm is bent, the biceps
(Plate CLXXXI. 5. 5.) has its belly very much raised,
as appears in the left arm. The like may be observed
of the triceps (Plate CLXXII. 6. 6.) when the arm is
extended, as observed in the right arm.
The straight muscles of the abdomen (Plate CLXXI.
7. 7.) appear very strong when riling from a decum-
bent posture.

The parts of the great serratus muscle (ib. 8. 8.)
which are received in the teeth or beginnings of the
oblique descending muscle immediately below, are very
much swelled when the shoulder on the same side is
brought forwards; that serratus muscle then being in
action in drawing the scapula forwards.
The long extending muscles of the trunk (Plate
CLXXII. 9. 9.) act alternately in walking, after this
manner: If the right leg bears the weight of the body,
and the left is in translation as on tiptoe, the last
mentioned muscles of the back on the left side may be
observed to be tautened on the other side about the
region of the loins, and so on the other side.
The trochanter, or outward and uppermost heads
of the thigh-bones (Plate CLXXXII. 10. 10.) vary
in their positions in the manner as no precise obser-
vations can explain their several appearances; but the
study after the life ought to be carefully attended to.

If the thigh is extended, as when the whole weight
of the body rests on that side, the gluteus or buttock
muscle (Plate CLXXII. 11. 11.) makes a very differ-
ent appearance from what offers at another time; but
if the thigh be drawn backwards, that muscle appears
still more and more tautened.

When the whole leg is drawn upwards forwards, and
at the same time the foot is inclined inwards, the up-
per part of the farrtus muscle (Plate CLXXXI. 12.
12.) appears riling very strong; in other positions of
the thigh, that muscle makes a sawing appearance
in its whole progress.

If a man is upon tiptoe the extending muscles of the
leg placed on the fore-part of the thigh (Plate
CLXXII. 13. 13. 13.) and thos of the foot that
composes the calf of the leg (Plate CLXXII. 14. 14.)
appear very strong, and the long peroneus (Plate
CLXXXI. 15.) makes a considerable indentation or saw-
ning at that time in its progress on the outside of the
leg.

Many other remarks might here be offered; but a
due attention to nature will soon discover them.
Drawing.

§ Of Light and Shade.

After the learner has made himself in some measure perfect in drawing outlines, his next endeavour must be to shade them properly. It is this which gives an appearance of substance, shape, distance, and distinction, to whatever bodies he endeavours to represent, whether animate or inanimate. The best rule for doing this is, to consider from what point, and in what direction, the light falls sideways on the picture, he must make that side which is opposite to it lightest, and that side which is farthest from it darkest.

If he is drawing the figure of a man, and the light be placed above the head, then the top of the head must be made lightest, the shoulders next lightest, and the lower parts darker by degrees. That part of the object must be lightest which hath the light most directly opposed to it; if the light falls sideways on the picture, he must make that side which is opposite to it lightest, and that side which is farthest from it darkest. If he is drawing the figure of a man, and the light be placed above the head, then the top of the head must be made lightest, the shoulders next lightest, and the lower parts darker by degrees. That part of the object, whether in naked figures, or drapery, or buildings that stands farthest out, must be made lightest, because it comes nearest to the light; and the light least so much of its brightness, by how much any part of the body bends inward, because those parts that stick out hinder the light and full brightness of the light from striking on those parts that fall in. Tuttian used to say, that he knew no better rule for the distribution of lights and shades than his observations drawn from a bunch of grapes. Sattins and silks, and all other shining stuffs, have certain glancing reflections, exceeding bright where the light falls strongest. The like is seen in armour, brass pots, or any other glittering metal, where you see a sudden brightness in the middle or centre of the light, which discovers the shining nature of such things. Observe also, that a strong light requires a strong shade, a fainter light a fainter shade; and that an equal balance be preferred throughout the piece between the lights and shades. Those parts which must appear round require but one stroke in shading, and that sometimes but very faint; such parts as should appear steep or hollow, require two strokes across each other, or sometimes three, which is sufficient for the deepest shade. Care must be also taken to make the outlines faint and small in such parts as receive the light; but where the shades fall, the outline must be strong and bold. The learner must begin his shading from the top, and proceed downward, and use his utmost endeavours both by practice and observation to learn how to vary the shadings properly; for in this consists a great deal of the beauty and elegance of drawing. Another thing to be observed is, that as the light is weakened by distances, so objects must seem more or less confused or clear according to the places they hold in the piece: Those that are very distant, — weak, faint, and confused; those that are near and on the foremost ground, — clear, strong, and accurately finished.

§ 7. Of Drapery.

In the art of clothing the figures, or casting the drapery properly and elegantly upon them, many things are to be observed. 1. The eye must never be in doubt of its object; but the shape and proportion of the part or limb, which the drapery is supposed to cover, must appear; at least so far as art and probability will permit: and this is so material a consideration, that many artists draw first the naked figure, and afterwards put the draperies upon it. 2. The drapery must not lie too close: the parts of the body: but let it seem to flow round, and as it were to embrace them; yet so as that the figure may be easy, and have a free motion. 3. The draperies which cover those parts that are exposed to great light must not be so deeply shaded as to seem to pierce them; nor should those members be crossed by folds that are too strong, left by the too great darkness of their shades the members look as if they were broken. 4. The great folds must be drawn first, and then stroked into lesser ones: and great care must be taken that they do not cross one another improperly. 5. Folds in general should be large, and as few as possible. However, they must be greater or less according to the quantity and quality of the stuffs of which the drapery is supposed to be made. The quality of the persons is also to be considered in the drapery. If they are magistrates, their draperies ought to be large and ample; if country clowns or slaves, they ought to be coarse and short; if ladies or nymphs, light and soft. 6. Suit the garments to the body, and make them bend with it, according as it stands in or out, straitforward, or crooked, or as it bends one way or another; and the closer the garment fits to the body, the narrower and smaller must be the folds. 7. Folds well imagined give much spirit to any kind of action; because their motion implies a motion in the acting member, which seems to draw them forcibly, and makes them more or less stirring as the action is more or less violent. 8. An artful complication of folds in a circumscribed manner greatly helps the effect of foreshortenings. 9. All folds consist of two shades, and no more; which you may turn with the garment at pleasure, shadowing the inner side deeper, and the outer more faintly. 10. The shades in silk and fine linen are very thick and small, requiring little folds and a light shadow. 11. Observe the motion of the air or wind, in order to draw the loose apparel all flying one way; and draw that part of the garment that adheres close to the body, before you draw the looser part that flies off from it; left by drawing the loose part of the garment first, you should mistake the position of the figure, and place it awry. 12. Rich ornaments, when judiciously and sparingly used, may sometimes contribute to the beauty of draperies. But such ornaments are far below the dignity of angels or heavenly figures; the grandeur of whose draperies ought rather to consist in the boldness and nobleness of the folds, than in the quality of the stuff or the glitter of ornaments. 13. Light and flying draperies are proper only to figures in great motion, or in the wind: but when in a calm place, and free from violent action, their draperies should be large and flowing; that, by their contrast, and the fall of the folds, they may appear with grace and dignity. Thus much for drapery; an example or two of which are given in Plate CLXVIII. See farther the articles Crayon and Painting.

§ 8. On the Passions.

The passions, says M. Le Brun, are motions, of the soul, either upon her pursuing what she judges to be for her good, or shunning what she thinks hurtful to her;
DRAWING.

her; and commonly, whatever causes emotion of passion in the soul, creates also some action in the body. It is therefore necessary for a painter to know which are the different actions in the body that express the several passions of the soul, and how to delineate them.

M. Le Brun has been extremely happy in expressing many of the passions, and the learner cannot study any thing better than the examples which he has left us of them. However, as M. De Piles justly observes, it is absurd as well as impollible to pretend to give such particular demonstrations of them as to fix their expression to certain strokes, which the painter should be obliged to make use of as essential and invariable rules. This, says he, would be depriving the art of that excellent variety of expression which has no other principle than diversity of imagination, the number of which is infinite. The same passion may be finely expressed several ways, each yielding more or less pleasure in proportion to the painter's understanding and the spectator's discernment.

Though every part of the face contributes towards expressing the sentiments of the heart, yet the eye-brow, according to M. Le Brun, is the principal seat of expression, and where the passions best make themselves known. It is certain, says he, that the pupil of the eye, by its fire and motion, very well shows the agitation of the soul, but then it does not express the kind or nature of such an agitation; whereas the motion of the eye-brow differs according as the passions change their nature. To express a simple passion, the motion is simple; to express a mixed passion, the motion is compound: if the passion be gentle, the motion is gentle; and if it be violent, the motion is so; change their nature. To express a simple passion, the motion is simple; to express a mixed passion, the motion is compound: if the passion be gentle, the motion is gentle; and if it be violent, the motion is so. We may observe farther, says he, that there are two kinds of elevation in the eye-brows. One, in which the eye-brows rise up in the middle; this elevation expresses agreeable sentiments, and it is to be observed that then the mouth rises at the corners: another, in which the eye-brows rise up at the ends, and fall in the middle; this motion denotes bodily pain, and then the mouth falls at the corners. In laughter, all the eye-brows fall upward toward the middle of the forehead, make the nose, the mouth, and the eyes, follow the same motion. In weeping, the motions are compound and contrary; for the eye-brows fall toward the nose and over the eyes, and the mouth rises that way. It is to be observed also, that the mouth is the part of the face which more particularly expresses the emotions of the heart: for when the heart complains, the mouth falls at the corners; and when it is at ease, the corners of the mouth are elevated; and when it has an aversion, the mouth flouts forward, and ribs in the middle.

The head (says M. De Piles) contributes more to the expression of the passions than all the other parts of the body put together. These separately can only show some few passions, but the head expresses them all. Some, however, are more peculiarly expressed by it than others: as humility, by hanging it down; arrogance, by lifting it up, languishing, by inclining it on one side; and obstinacy, when with a stiff and resolute air it stands upright, fixed, and stiff between the two shoulders. The head also shows our supplications, threats, mildness, pride, love, hatred, joy, and grief. The whole face, and every feature, contributes something: especially the eyes; which, as Cicero says, are the windows of the soul. The passions they more particularly discover are, pleasure, languishing, scorn, severity, mildness, admiration, and anger; to which one might add joy and grief, if they did not proceed more particularly from the eye-brows and mouth; but when those two passions fall in also with the language of the eyes, the harmony will be wonderful. But though the passions of the soul are most visible in the lines and features of the face, they often require the assistance also of the other parts of the body. Without the hands, for instance, all action is weak and imperfect; their motions, which are almost infinite, create numberless expressions; it is by them that we desire, hope, promise, call, send back; they are the instruments of threatening, prayer, horror, and praise; by them we approve, condemn, reject, admit, fear, ask; express our joy and grief, our doubts, regrets, pain, and admiration. In a word, it may be said, as they are the language of the dumb, that they contribute "not a little to speak a language common to all nations, which is the language of painting. But to say how these parts must be disposed for expressing the various passions, is impossible, nor can any exact rules be given for it, both because the task would be infinite, and because every one must be guided in this by his own genius and the particular turn of his own studies." See the article Passions, and the Plate there referred to.


The learner may proceed now to make some attempts at drawing flowers, fruits, birds, beasts, and the like; not only as it will be a more pleasing employment, but as it is an easier task, than the drawing of hands and feet, and other parts of the human body, which require not only more care, but greater exactness and nicer judgment. Very few rules or instructions are requisite upon this head; the best things the learner can do, is to study with himself with good prints or drawings by way of examples, and with great care and exactness to copy them. If it is the figure of a beast, begin with the forehead, and draw the nose, the upper and under jaw, and stop at the throat. Then go to the top of the head, and form the ears, neck, back, and continue the line till you have given the full shape of the buttock. Then form the breast, and mark out the legs and feet, and all the smaller parts. And, last of all, finish it with the proper shadows. It is not amiss, by way of ornament, to give a small sketch of landscapes, and let it be suitable and natural to the place or country of the beast you draw. Much the same may be said with regard to birds. Of these, as well as beasts and other objects, the learner will find many examples among the plates given in this work.

§ 10. Of drawing Landscapes, Buildings, &c.

Or all the parts of drawing, this is the most useful and necessary, as it is what every man may have occasion for at one time or another. To be able on the spot, to take the sketch of a fine building, or a beautiful prospect; of any curious productions of art, or
DRAWING.

uncommon appearance in nature; is not only a very desirable accomplishment, but a very agreeable amuse¬
ment. Rocks, mountains, fields, woods, rivers, cata¬
racts, cities, towns, castles, houses, fortifications, ruins, or whatsoever else may present itself to view on our
journeys or travels in our own or foreign countries, may be thus brought home, and preferred for our future
use either in business or conversation. On this part,
therefore, more than ordinary pains should be bestowed.

All drawing consists in nicely measuring the distan¬
ces of each part of the piece by the eye. In order to
facilitate this, let the learner imagine in his own mind,
that the piece he copies is divided into squares. For
example: Suppose he imagine a perpendicular and a
horizontal line crossing each other in the centre of the
picture you are drawing from; then suppose also two
such lines crossing your own copy. Observe in the
original, what parts of the design those lines intersect,
and let them fall on the same parts of the supposed
lines in the copy: We say, the supposed lines; because
though engravers, and others who copy with great
exactness, divide both the copy and original into many
squares, as below: yet this is a method not to be re¬
commended, as it will be apt to deceive the learner,
who will fancy himself a tolerable proficient, till he
comes to draw after nature, where these helps are not
to be had, when he will find himself miserably defec¬
tive and utterly at a loss.

If he is to draw a landscape from nature, let him
take his station on a rising ground, where he will
have a large horizon; and mark his tablet into three divi-

fions, downwards from the top to the bottom; and
divide in his own mind the landscape he is to take, in
to three divisions also. Then let him turn his face di-
rectly opposite to the middle of the horizon, keeping
his body fixed, and draw what is directly before his
eyes upon the middle division of the tablet; then turn
his head, but not his body, to the left hand, and de-
lineate what he views there, joining it properly to
what he had done before; and, lastly, do the fame by
what is to be seen upon his right hand, laying down
everything exactly both with respect to distance and
proportion.

The best artists of late, in drawing their land¬
scapes, make them shoot away one part lower than another.
Those who make their landscapes mount up higher and
higher, as if they stood at the bottom of a hill to take
the prospect, commit a great error: the best way is to
give upon a rising ground, make the nearest objects in
the piece the highest, and those that are farther off
to shoot away lower and lower till they come almost level
with the line of the horizon, lessening every thing propor-
tionably to its distance, and observing also to make
the objects fainter and less distinct the farther they are
removed from the eye. He must make all his lights
and shades fall one way, and let every thing have its
proper motion: as trees shaken by the wind, the small
boughs bending more, and the large ones less: water
agitated by the wind, and dashing against ships or
boats; or falling from a precipice upon rocks and
flanes, and spurring up again into the air, and sprinking
all about: clouds also in the air, now gathered
with the winds; now violently condensed into hail,
rain, and the like: Always remembering, that what¬
ever motions are caused by the wind must be made all
to move the same way, because the wind can blow but
one way at once.

Finally, it must be observed, that in order to attain
any considerable proficiency in drawing, a knowledge of
PERSPECTIVE is absolutely necessary; see that article.

DRA

DRAY, a kind of cart used by brewers for carry¬
ning barrels of beer or ale; also a hedge drawn without
wheels.

DRAY, among sportsmen, denotes squirrel nests built
in the top of trees.

DRAIYTON (Michael), an eminent English poet,
born of an ancient family in Warwickshire in 1563.
His propensity to poetry was extremely strong, even
from his infancy; and we find the most of his principal
poems published, and himself highly distinguished as a
poet, by the time he was about 30 years of age.---It
appears from his poem of Moses's Birth and Miracles,
that he was a spectator at Dover of the famous Spanish
armada, and it is not improbable that he was engaged
in some military employment there. It is certain, that
not only for his merit as a writer, but his valuable qua-
lities as a man, he was held in high estimation, and
strongly patronized by several personages of conse¬
quence; particularly by Sir Henry Goodere, Sir Wal-
ter Aton, and the Countes of Bedford; to the first
of whom he owns himself indebted for great part of
his education, and by the second he was for many years
supported.

DRE

His poems are very numerous; and so elegant, that
his manner has been copied by many modern writers
of eminence since. Among these the most celebrated
one is the Poly-Albion, a chorographical description of
England, with its commodities, antiquities, and cu-
tivities, in metre of 12 syllables; which he dedicated
to Prince Henry, by whose encouragement it was written:
and whatever may be thought of the poetry, his
descriptions are allowed to be exact. He was styled
post laureo in his time: which, as Ben Johnson was
then in that office, is to be understood in a loose sense
of approbation as an excellent poet; and was bestowed
on others as well as Drayton, without being confined
strictly to the office known by that appellation. He
died in 1631; and was buried in Westminster-abbey
among the poets, where his hift is to be seen, with an
epitaph penned by Ben Johnson.

DREAMS, are all those thoughts which people
feel passing through their minds, and those imaginary
transfigurations in which they often fancy themselves en-
gaged, when in the state of sleep.

Scarce any part of nature is left open to our obser-
vation than the human mind in this state. The
DREAMS. (119) DREAMS.

Dreamer himself cannot well observe the manner in which dreams arise or disappear to him. When he awakes, he cannot recollect the circumstances of his dreams with sufficient accuracy. Were we to watch over him with the most vigilant attention, we could not perceive with certainty what emotions are excited in his mind, or what thoughts pass through it, during his sleep. But though we could ascertain these phenomena, many other difficulties would still remain. What parts of a human being are active, what dormant, when he dreams? Why does not he always dream while asleep? Or why dreams he at all? Do any circumstances in our constitution, situation, and peculiar character, determine the nature of our dreams?

We may lay before our readers such facts as have been ascertained concerning dreaming, and the most plausible conjectures that have been offered to explain those particulars, about which we can only conjecture, or have at least hitherto obtained nothing more certain than conjecture.

1. In dreaming, we are not conscious of being asleep. This is well known from a thousand circumstances. When awake, we often recollect our dreams; and we remember such occasions, that while those dreams were passing through our minds, it never occurred to us that we were separated from sleep by a deep from the active world. We are often observed to act and talk in dreaming, as if we were badly engaged in the intercourse of social life.

2. In dreaming, we do not consider ourselves as witnesses or bearing a part in a fictitious scene: we seem not to be in a familiar situation with the actors in a dramatic performance, or the spectators before whom they exhibit, but engaged in the busines of real life. All the varieties of thought that pass through our minds when awake may also occur in dreams; all the images which imagination presents in the former state, she is also able to call up in the latter; all the same emotions may be excited, and we are often actuated by equal violence of passion; none of the transactions in which we are capable of engaging while asleep is impossible in dreams: in short, our range of action and observation is equally wide in the one state as in the other; and while dreaming, we are not sensible of any difficulty in between our dreams and the events and transactions in which we are actually concerned in our intercourse with the world.

3. It is laid, that all men are not liable to dream. Dr. Beattie, in a very pleasing essay on this subject, relates, that he knew a gentleman who never dreamed except when his health was in a disorder state: and Locke mentions somewhere, that a certain person of his acquaintance was a stranger to dreaming till the 26th year of his age; and then began to dream in consequence of having a fever. These, however, are too few, and we have not been able to obtain more; and, besides, it does not appear that those persons who had always attended, with the care of a philosopher making an experiment, to the circumstances of their sleep. They might dream, but not recollect their dreams on awaking; and they might both dream and recollect their dreams immediately upon awaking; yet afterwards suffer the remembrance of them to slip out of the memory. We do not advance this therefore as a certain fact concerning dreaming; we are rather inclined to think it a mistake.

But though it appears to be by no means certain that any of the human race are through the whole of life absolute strangers to dreaming; yet it is well known that all men are not equally liable to dream. The same person dreams more or less at different times; and as one person may be more exposed than another to those circumstances which promote this exercise of fancy, one person may therefore dream more than another. The same diversity will naturally take place in this as in other accidents to which mankind are in general liable.

4. Though in dreams imagination appears to be free from all restraint, and indulges in the most wanton freaks; yet it is generally agreed, that the imaginary transactions of the dreamer bear always some relation to his particular character in the world, his habits of action, and the circumstances of his life. The lover we are told, dreams of his mistress; the miser of his money; the philosopher renew his researches in sleep often with the same pain and fatigue as when awake; and even the merchant, at times, returns to balance his books, and compute the profits of an adventure, when flumbering on his pillow. And not only do the more general circumstances of a person's life influence his dreams; his passions and habits are nearly the same when asleep as when awake. A person whose habits of life are virtuous, does not in his dreams plunge into a series of crimes; nor are the vicious reformed when they pass into this imaginary world. The choleric man finds himself offended by slight provocation as well in his dreams as in his ordinary intercourse with the world, and a mild temper continues pacific in sleep.

5. The character of a person's dreams is influenced by his circumstances when awake in a still more unaccountable manner. Certain dreams usually arise in the mind after a person has been in certain situations. Dr. Beattie relates, that he once, after riding 30 miles in a high wind, passed a part of the succeeding night in dreams beyond description terrible. The state of a person's health, and the manner in which his vital functions are carried on, have a considerable influence in determining the character of dreams. After too full a meal, or after eating of an unusual sort of food, a person has always dreams of a certain nature.

6. In dreaming, the mind for the most part carries on no intercourse through the senses with surrounding objects. Touch a person gently who is asleep, he feels not the impression. You may awake him by a smart blow; but when the stroke is not sufficiently violent to awake him, he remains insensible of it. We speak softly beside a person asleep without fearing that he will overhear us. His eye-lids are shut; and even though light should fall upon the eye-ball, yet still his powers of vision are not awakened to active exertion, unless the light be so strong as to rouze him from sleep. He is insensible both to sweet and to disagreeable smells. It is not easy to try whether his organs of taste retain their activity, without awakening him; yet from analogy it may be presumed that these too are inactive. With respect to the circumstances here enumerated,
It is indifferent whether a person be dreaming or buried in deep sleep.

Yet there is a remarkable fact concerning dreaming which may seem to contradict what has been here asserted. In dreams, we are liable not only to speak aloud in consequence of the suggestions of imagination, but even to get up, and walk about and engage in little enterprises, without awaking. Now, as we are in this instance so active, it seems that we cannot be then insensible of the presence of surrounding objects. The sleep-walker is really sensible in a certain degree of the presence of the objects around him; but he does not attend to them with all their circumstances, nor do they excite in him the same emotions as if he were awake. He feels no terror on the brink of a precipice; nor do they excite in what has been above advanced.

Yet their is one remarkable difference between dreams and waking. A person will continue to hear the noise of falling aileep. We know not whether he awakes on the sudden, or in a manner which cannot be accounted for any other way than by supposing that he is roused by some impulse received in a dream. The same thing is observable of others of the inferior animals. That they should dream, is not an idea inconsistent with what we know of their economy and manners in general. We may, therefore, consider it as a pretty certain truth, that many, if not all, of the lower species are liable to dream as well as human beings.

8. Not only do a person's general character, habits of life, and state of health, influence his dreams; but those concerns in which he has been most deeply interested during the preceding day, and the views which have arisen most frequently to his imagination, very often afford the subjects of his dreams. When I look forward with anxious expectation towards any future event, I am likely to dream either of the disappointment or the gratification of my wishes. Have I been engaged during the day, either in business or amusements which I have found exceedingly agreeable, or in a way in which I have been extremely unhappy? either my happiness or my misery is likely to be renewed in my dreams.

8. Though dreams have been regarded among almost all nations through the world, at least in some periods of their history, as prophetic of future events; yet it does not appear that this popular opinion has been established on good grounds. Christianity, indeed, teaches us to believe, that the supreme Being may, and actually does, operate on our minds, and influence at times the determinations of our will, without making us sensible of the restraint to which we are thus subjected. And, in the same manner, no doubt, the suggestions which arise to us in dreams may be produced. The imaginary transactions in which we are then engaged, may be such as are actually to occupy us in life; the strange and seemingly incoherent appearances which are then presented to the mind's eye, may allure to some events which are to befal ourselves or others. It is, therefore, by no means impossible, or inconsistent with the general analogy of nature, that dreams should have a respect to futurity. We have no reason to regard the dreams which are related in the Holy Scriptures to have been prophetic of future events, as not inspired by heaven, or to laugh at the idea of a prophetic dream as absurd or ridiculous.

Yet it would be too much to allow to dreams all that importance which has been ascribed to them by the priesthood among heathen nations, or by the vulgar among ourselves. We know how easily ignorance imposes on itself, and what arts imposture adopts to impose upon others. We cannot trace any certain connection between our dreams and those events to which the simplicity of the vulgar pretends that they refer. And we cannot, therefore, if disposed to confine our belief to certain or probable truths, join with the vulgar in believing them really referable to futurity.

9. It appears that the brutes are also capable of dreaming. The dog is often observed to start suddenly up in his sleep, in a manner which cannot be accounted for any other way than by supposing that he is roused by some impulse received in a dream.

There is also another fact not quite consonant with what has been above advanced. It is said, that in sleep a person will continue to hear the noise of a catarrh in the neighbourhood, or regular strokes with a hammer, or any similar sound sufficiently loud, and continued uninterruptedly from before the time of his falling asleep. We know not whether he awakes on the sudden cessation of the noise. This fact is afforded on sufficient evidence: it is curious. Even when asleep, if very deeply intent on any piece of study, or closely occupied in business, the sound of a clock striking in the neighbourhood, or the beating of a drum, will escape us unnoticed: and it is therefore the more surprising that we should thus continue sensible to sounds when asleep.

9. Not only do a person's general character, habits of life, and state of health, influence his dreams; but those concerns in which he has been most deeply interested during the preceding day, and the views which have arisen most frequently to his imagination, very often afford the subjects of his dreams. When I look forward with anxious expectation towards any future event, I am likely to dream either of the disappointment or the gratification of my wishes. Have I been engaged during the day, either in business or amusements which I have found exceedingly agreeable, or in a way in which I have been extremely unhappy? either my happiness or my misery is likely to be renewed in my dreams.
The writer of this article has been told by a respectable old gentleman of his acquaintance, since dead, that he had frequently dreams of this nature. The fact may therefore be considered as unquestionable.
Dreams.

Dreams. There is a deficiency of this vital fluid in the extremities of the nerves, or when from any other cause it ceases to communicate to the brain the peculiar motion alluded to, we must naturally fall asleep, and become insensible of our existence. It followed of consequence, that, in sleep, the nervous fluid between the extreme parts of the nerves and the brain must either be rest, or be deficient, or be prevented by some means from passing into the brain; and it was concluded, that whenever irregular motions of this fluid were occasioned by any internal cause, dreaming was produced.—In this manner it appeared that we might be deceived with regard to the operation of any of the senses; so as to fancy that we saw objects not actually before us,—to hear imaginary sounds,—to taste,—to feel, and so as to fancy that we saw fore us when awake, though our eyes be closed by any internal cause, to smell in imagination. The instances of dreaming in which our powers of imagination are often a symptom in nervous diseases, is in all probability owing to something in the nature of that fluid, which is often a symptom in nervous diseases, is in all probability owing. The instances of dreaming, therefore, we may learn to regard with that respect to which they are owing. The reader who is disposed to speculate farther on this subject, may consult Beattie’s Essays, Hartley on Man, and the principal writers on physiology.

Dreelincourt (Charles), minister of the reformed church at Paris, was born at Sedan in 1595, where his father enjoyed a considerable post. He had all the qualifications that compose a respectable clergyman; and though he defended the Protestant cause against the Romish religion, was much esteemed among the Catholics. He is best known in England by his confolations against the Fears of Death, which work was translated, and is often printed. He married the daughter of a rich merchant at Paris, by whom he had 16 children. His third son, professor of phyic at Leyden, was physician to the Prince and Princess of Orange before their accession to the crown of England. Bayle has given him a high character. Mr Drelincourt died in 1660.

DREUNCH, among farriers, a phylical potion for horses. The ingredients for this purpose are to be coarsely beat, and either mingled with a decoction or with wine. Then let all infare about a quarter of an hour, and give it to the horse with a horn after he has been tied up two hours to the rack.

DREPANE, the ancient name of Corea, from the curvity of its figure, resembling a sickle.

DREPANE, DREPAUM, (anc. geog.), a town of Bithynia, situated between the Sinus Attacenus and the Bosphorus Thracus; called Helenopolis by Constan- tine, in honour of his mother Nicephorus Callitius.

DREPANUM (anc. geog), the promontory Rhium in Achaia; so called because bent in the manner of a fickle.—Another Drepandum on the Arabic Gulf, on the side of Egypt. A third on the north side of Crete, situated between Cydonia and the Sinus Amphimallus. A fourth on the west side of Cyprus. A fifth, a promontory of Cyrenaica, on the Mediterranean.

DREPANUM, -i, or Drepana-srum, a town and port on the west side of Sicily, and to the west of mount Eryx: Drepanum the people. Now Trepanda, a cit- ty and port-town on the westmost point of Sicily. E. Long. 13. 2. Lat. 38. 0.

DRESDEN, the capital city of the electorate of Saxony in Germany. It is seated on the river Elbe, which divides it into two parts. One part is called Old Dresden, and the other the New Town, in the German language Neustadt. They are joined together by a stone bridge, supported by 19 piers, and 650 paces in length.
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Dresden,

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length. As this bridge was too narrow for the crowds of people that were continually falling and repelling, King Augustus, in 1739, caused two walls for foot-passengers to be built, one on each side, in a very wonderful manner; the one for those that go into the city, and the other for those that return back. These are bordered with iron palisades of curious workmanship. Dresden is surrounded by strong and handsome fortifications; and contains, according to the latest accounts, 110,000 inhabitants.

All the buildings of this city are constructed with square free stone, and are almost all of the same height. They have flown from the neighborhood of Pirna, about ten miles from this city, which is readily brought down the Elbe. In general the houses are high and strong; the streets wide, straight, well paved, clean, and well illuminated in the night; and there are large squares, disposed in such a manner, that Dresden may pass for one of the handsomest cities in the world. The elector's palace is a magnificent structure, and abounds in many valuable curiosities both of nature and art. The collection of pictures is reckoned one of the finest that exists, and is valued at 500,000l.

Above 700 men are here constantly employed in the porcelain manufacture, the annual expense of which is estimated at no more than 80,000 crowns; and the manufacture yields to the king 200,000 crowns yearly, besides the magnificent presents which he occasionally makes, and the large quantity reserved for the use of his household.

The other most considerable article of trade is silver, of which the mines near Fridburg produce every 15 days near the value of 20,000 dollars. The metal is brought into the city in ingots, where it is immediately coined and delivered to the proprietors.

The court of Dresden is one of the most remarkable in Europe for splendor and profusion. Six thousand five hundred ducats are yearly allowed for comfits and similar articles, which is near twice as much as the king of Prussia allows for the whole expense of his table. The revenues of the elector are estimated at about 1,576,000l.; which arise from the taxes on lands, and a capitation of six dollars on all males as soon as they commence an apprenticeship or begin to work. People of a higher rank are taxed according to their clafs, and are liable to be called to account if they assume not an exterior appearance correspondent to the extent of their fortune. Every foreigner pays capitulation after residing six months in the country. The Jews are taxed at 50, their wives at 30, and their children at 20 dollars. There is also an excise on all eatables and liquors; and 10 per cent. is levied out of the incomes of the people.

Though this city lies in a low situation, yet it hath agreeable prospects. It is supplied with a prodigious quantity of provisions, not only out of the neighborhood, but from Bohemia, which are brought every market-day, which is twice a-week. E. Long. 13° 34'. N. Lat. 51° 12'.

DRESSING Hemp and Flax. See Flax.

Dressing of Meat, the preparing them for food by means of culinary fire.

The design of dressing is to loosen the compages or texture of the flesh, and dispose it for distillation and digestion in the stomach. Fleish not being a proper food without dressing, is alleged as an argument that man was not intended by nature for a carnivorous animal.

The usual operations are roasting, boiling, and stewing. In roasting, it is observed, meat will bear a much greater and longer heat than either in boiling or stewing; and in boiling, greater and longer than in stewing. The reason is, that roasting being performed in the open air, as the parts begin externally to warm, they extend and dilate, and so gradually let out part of the rarefied included air, by which means the internal succussions, on which the distillation depends, are much weakened and abated. Boiling being performed in water, the pressure is greater, and consequently the succussions to lift up the weight are proportionably strong; by which means the coating is thickened; and even in this way there are great differences; for the greater the weight of water, the fourier is the business done.

In stewing, though the heat be infinitely short of what is employed in the other ways, the operation is much more quick, because performed in a close vessel, and full; by which means the succussions are often repeated, and more strongly reverberated. Hence the force of Papin's digestor; and hence an illustration of the operation of digestion.

Boiling, Dr. Cheyne observes, draws more of the strong broths from meat, and leaves it less nutritive, more diluted, lighter, and easier of digestion: roasting, on the other hand, leaves it fuller of the strong nutritive juices; harder to digest, and needing more dilution. Strong, grown, and adult animal food, therefore, should be boiled; and the younger and tender roasted.

Dressing, in surgery, the treatment of a wound or any disordered part. The apparatus of dressing consists of cloths, tents, plasters, compresses, bandages, bands, ligatures, and strings. See SURGERY.

Drexelius (Jeremiah), a Jesuit celebrated for his piety and writings, was born at Ansbach, and became preacher in ordinary to the elector of Bavaria. He wrote several pious and practical pieces, which have been printed together in two volumes folio; and died in 1638.

Drevert (Peter) the Younger, an eminent French engraver, was a member of the royal academy of painting and sculpture: and died at Paris in 1739, at 42 years of age. His portraits are neat and elegant; but laboured to the last degree. He particularly excels in representing lace, silk, fur, velvet, and other ornamental parts of dress. His father was excellent in the same art; and had instructed, but was flattered by the son. The younger Drevert did not confine himself to portraits. We have several historical prints by him, in which, in point of neatness and exquisite workmanship are scarcely to be equaled. His most esteemed and best historical print is very valuable; but the first impressions of it are rarely to be met with: it is, The Presentation of Christ in the Temple; a very large plate, lengthwise, from Louis de Bologna. The following défert also to be particularized. The Meeting of Abraham's Servant with Rebecca at the Q 2...
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Well; a large upright plate, from An. Copel; and Abraham, with his Son Isaac on the Altar, the fame, from the fame, dated 1707; the first impressions of which are before the work upon the right thigh of Isaac was altered, the curved lines from the button almost down to the knee being in those impressions arched downwards, but in posterior ones arched upwards. Among his portraits, the two following are jutly held in the highest estimation: M. Bouvet Bishop of Meaux; a whole-length figure standing, a madding sized upright plate, from Rigaud: and Samuel Bernard; a whole-length figure sitting in a chair, a large upright plate. The first impressions of the last are, before the words Contesl d'Elat were inserted upon the plate.

DREUX, a town in the Ile of France, remarkable for its antiquities; and for the battle which was fought in December 1562 between the Papists and the Protestants, wherein the former gained the victory. Some think it took its name from the priests of Gaul, called the Druids, in the times of paganism. It consists of two parishes, St Stephen’s and Notre Dame, called the great church, which is pretty well built. It is seated on the river Blaisse, at the foot of a mountain, on which is a ruined castle. E. Long. I. 27. N. Lat. 48° 44'.

DRIEPER, or RIJEER, a river of Ruflia, which rives in the forest of Volkonfs, near the source of the Volga, about 100 miles from Smolenko. It passes by Smolenoko and Mohilir, separates the Ukraine from Poland, flows by Kiof, and falls into the Black Sea between Orzakof and Kinburn. By the acquisition of the province of Mohilir, its whole course is now included within the borders of Russia. Augustin, in the 13th volume of his Travels, says, that he had been informed by aLim of his acquaintance that a tower once stood on the summit of this mountain, which has given rise to the name of Hainnuys. It was of a height of about 300 feet, at the summit of which, on a rock, was an oblong building, 150 feet by 60, of stone, and the whole occupied by a great number of rooms. It seems to have been the residence of the chief of the district, who had a large number of inhabitants under him. This tower was of immense size, and of such a height as to be seen from a great distance. It is said that this tower was destroyed by the Tartars, and that the inhabitants of the district were obliged to retire to the interior of the country, where they formed a new settlement. The name of Hainnuys is still preserved in the possession of the Tartars, who regard it with the greatest reverence, and call it the place of the god.

DRIFT, in navigation, the angle which the line of a ship’s motion makes with the nearest meridian, when she drives with her side to the wind and waves, and is not governed by the power of the helm: it also implies the distance which the ship drives on that line. A ship’s way is only called drift in a storm, and then when it blows very vehemently as to prevent her from carrying any sail, or at least restrains her to such a portion of sail as may be necessary to keep her sufficiently inclined to one side, that she may not be disabled by her violent labouring produced by the turbulence of the sea.

DRIFF, in mining, a passage cut out under the earth betwixt shaft and shaft, or turn and turn; or a passage or way wrought under the earth to the end of a meet of ground, or part of a meet.

DRIFF-fall, a fall used under water, veered off right a-head by sheets, as other falls are. It serves to keep the ship’s head right upon the sea in a storm, and to hinder her driving too fast in a current.

DRILL, in mechanics, a small instrument for making such holes as punches will not conveniently serve for. Drills are of various sizes, and are chiefly used by smiths and turners.

DRILL, or Drill-Box, a name given to an instrument for fowing land in the new method of horse-hoeing husbandry. See Agriculture.

DRILL-SCREWS, a method of fowing grain or seed of any kind, so that it may all be at a proper depth in the earth, which is necessary to its producing healthful and vigorous plants. For this purpose a variety of drill-ploughs have been invented and recommended: but from the expense attending the purchase, and the extreme complication of their structure, there is not an instrument of that kind, as yet discovered, that is likely to be brought into general use. This method, however, is greatly recommended in the Geographical Essays, where we have the following observations and experiments.—"Grain sown by the hand, and covered by the harrows, is placed at unequal depths; the seeds consequently sprout at different times, and produce an unequal crop. When barley is sown late, and a drought succeeds, the grain that was sown in the moisture of the earth soon appears, while such as was left near the surface lies baking in the heat of the sun, and does not vegetate till plentiful rains have moistened the soil. Hence an inequality of the crop, an accident to which barley is particularly liable. The same observation, but in a more striking manner, may be made upon the sowing of turnips. It frequently happens that the husbandman, is obliged to sow his seed in very dry weather, in hopes that rain will soon follow; and either rolls or covers it with a bulb-harrow. We will suppose, that, contrary to his expectations, the dry weather continues. The seed, being near the surface, cannot sprout without rain. The bulb-harman is mortified at his disappointment, but is soon satisfied and made easy by a perfect acquiescence in what he thinks is the will of Providence. The fowage that he feels must not be placed to the dispenison of Providence, but has its source in the unequal depths; the seeds being sown at different times, and produced at different periods. Had he judiciously buried the seed in the moist part of the soil with the drill plough, or harrowed it well with the common harrow, his seed would have vegetated in due season, and bountifully repaid him for his toil.

In the year 1769, a 15 acre clove was prepared for turnips. The land was in fine condition as to lightness, and had been well manured. On the 24th of June, 14 acres were sown with turnip seed broad-cast, and harrowed in with a bulb-harrow. The remaining acre was sown the same day with the drill-plough, allowing 14 inches between the rows, and the shares being set near two inches deep. At the time of sowing, the land was extremely dry, and the drought continued from the time of sowing to the 5th of July; so that the broad cast did not make its appearance till about the 8th of that month, at which time the drill turnips, were in rough leaf, having appeared upon the surface the sixth day after sowing.

In the driest seasons, at the depth of two inches or less, we are sure of finding a sufficiency of moisture to make the seed germinate. When that is once accomplished, a small degree of moisture will carry on the work of vegetation, and bring the tender plants forward to the surface. When extreme dry weather oblige the broad-cast farmer to sow late, he has no opportunity of sowing a second time if the sky should get into the field. The drill secures him in some degree against that misfortune, by giving him a full command over the seasons.

The excellence of the drill-plough is not confined to turnip-seed; it is an useful instrument for fowing all kinds
DRILLING is popularly used for exercising soldiers. The word is derived from the French driller, which signifies a raw folder.

DRIMYS, in botany: A genus changed by Murray, in the 14th edit. of Syll. Veget. to Wintera; which see.

DRINK, a part of our ordinary food in a liquid form. See Food.

The general use of drink is to supply fluid; facilitate solution; in consequence of that, to expedite the evacuation of the stomach, and promote the progress of the aliment through the intestines: for, by the contraction of the longitudinal fibres of the stomach, the pylorus is drawn up, and nothing but fluid can pass; which, by its bulk, makes a hurried progress through the intestines, and so determines a greater excretion by stool, as lees then can be absorbed by the body.

Hence a large quantity of common water has been found purgative; and, ceteris paribus, that aliment which is accompanied with the largest proportion of drink, makes the largest evacuation by stool. Here a question has arisen, about where the feculent part of the aliment is first remarkably collected. It is commonly thought to be in the great guts; but undoubtedly it often begins in the lower part of the ileum, especially when the drink is in small proportion, and when the progres of the aliment is slow; for when the contents of the guts are very fluid, they are quickly pushed on, and reach the great guts before they deposit any feculency. Another effect of drink is, to facilitate the mixture of the lymph, rebound from every part of the system, with the chyle. In the blood-veins, where all must be kept fluid in order to proper mixture, drink increases the fluidity, and gives tension, by its bulk, without concomitant acrimony or too much elasticity, and so strengthens and ciliatory motion: hence drink contributes to fermentation, and sometimes food gives too dense a nutriment to be acted upon by the solids; and hence also we can see how drink promotes the secretions. These are the effects of drink in general; but what has been said must be taken with some limitations: for the more liquid the food, it is sooner evacuated, and less nourishment is extracted. Hence drink is, in some degree, opposed to nourishment: and for, ceteris paribus, those who use least drink are most nourished.

All the effects of drink abovementioned are produced by simple water; and it may be said, that other liquors are fit for drink in proportion to the water they contain. Water, when used as drink, is often impregnated with vegetable and farinaceous substances; but, as drinks, these impregnations are of little consequence: they add, indeed, a little nourishment; but this is not to be regarded in a healthy state. Sometimes we impregnate water with the fuchs acido-dulce; and then, indeed, it acquires other qualities, of considerable use in the animal economy. All drinks, however, may be reduced to two heads: first, pure water, or where the additional substance gives no additional virtue; secondly, the fermentatae. Of the first we have already spoken; and the latter have not only the qualities of the first, but also qualities peculiar to themselves.

Fermented liquors are more or less poignant to the taste, and better calculated to quench thirst. Thirst may be owing to various causes: first, to defect of fluid in the system, which occurs a scanty secretion in the mouth, fauces, and stomach; the dryness of the mouth and fauces will also in this case be increased, by their continual exposure to the perpetual flux and reflux of the evaporating air. Secondly, thirst depends on a large proportion of solid viscid food: thirdly, on an alkaline aliment, especially if it has attained any thing of the putrefactive taint: fourthly, on the heat of the system; but this seems to operate in the same manner as the first cause, giving a sense of dryness from its diffipation of the fluids. The fermented liquors are peculiarly adapted for obviating these causes; simulating the mouth, fauces, and stomach, to throw out the saliva and gastric liquor by their poignant: by their acrimony they are fitted to destroy alkaline ferment acrimony, to quench thirst from that cause: by their fluidity they dilute viscid food; though here, indeed, they anwer not better than common water. In two ways they promote the evacuation by stool, and progress through the intestines: first, by their fluidity and bulk; secondly, by their acrimony, which, uniting with the bile, forms the peculiar flavumus formerly mentioned. Carried into the blood-veins, in so far as they retain any of the saline nature, they stimulate the

excre-
Drink, excretories, and promote urine and sweat; correcting thus alkaline, not only by mixture, but diffusion of the degenerated fluids.

Many physicians, in treating of fermented liquors, have only mentioned these qualities rejecting their nutritious virtue, which certainly ought to be taken in; though by expediting the evacuation by stool they make legs of the nutritious parts of the aliment to be taken up, and by stimulating the excretories make these nutritious parts to be for a shorter time in the system. All these and many more triflous parts to be for a shorter time in the system, as a ferment, and so producing flatulency, purging, cholera, &c.: so that, with vegetable aliment, as little drink is necessary, the most innocent is pure water; and it is only with animal food that fermented liquors are necessary. In warmer climates, fermented liquors would seem necessary to obviate alkaline and heat. But it should be considered, that though fermented liquors contain an acid, yet they also contain alcohol; which, though it adds spirit to the stomach, yet is extremely hurtful in the warmer climates, and wherever alkaline prevals in the system. Nature, in these climates has given men an appetite for water; and wherever it is only with animal food that fermented liquors are necessary, it is with animal food that fermented liquors are necessary.

DROGHEDA, a town of Ireland, in the province of Leinster and county of Louth, and situated on a bay of the same name, in W. Long. 6. 6. N. Lat. 53. 45. It was formerly very remarkable for its situation and strength. In consequence of this it was much distinguished by the old English monarchs. Edward II. granted it a market and fair; and to these were added other great privileges in succeeding ages, particularly the right of coinage. It was bravely defended against the rebels in 1641. After the cessation of arms it was taken by the duke of Ormond and the earl of Inchiquin; but was retaken by Cromwell in 1649. At this time it suffered so much, that for a long time after it remained almost in ruins. The buildings were exceedingly shattered; and the town being taken by form, not only the garrison, but the inhabitants, men, women, and children, were mostly put to the sword. By degrees, however, it recovered, and is at present a large and populous place. It is a town and county; and as such sends two representatives to parliament. It has a great share of inland trade, and an advantageous commerce with England: and though the port is but indifferent, and narrow at its entrance, with a bar over which ships cannot pass but at high water, yet a great deal of business is done; so that, from a low and declining port, it is now become rich and thriving.

Drogheh. is perhaps one of the strongest instances that can be mentioned of the ineffable benefit of a river in any degree navigable: for though the Boyne is not capable of carrying vessels bigger than barges, or pretty large boats, yet the convenience of this affords of conveying coals by water-carriage through a great extent of country, introduced a correspondence between this place and Whitehaven in Cumberland, to which the revival of its commerce has been in a great measure owing.

DROITWITCH, a town of Worcestershire in England, noted for excellent white salt made from the salt springs in its neighbourhood. It sends two members to parliament. W. Long. 2. 16. N. Lat. 52. 20.

DROMEDARY. See Camelus.

DROMORE, a town of Ireland, in the county of Down. It is a very ancient town, and the seat of a bishopric. The see was founded by St Colman in the 6th century. It was refounded by King James I. who, by his charters (now preserved in the Rolls-office), granted it very great and uncommon privileges. Among such other
Drone. other marks of royal favour, he distinguishes the bishops of this fee by the style of "A. B. by Divine Providence bishop of Dromore:" whereas all other bishops in Ireland, except those of Meath and Killare, are styled, "by Divine Permission:" This fee, although the least in its extent, is so complete and perfect in its endowment and jurisdiction, that it need not envy the greatest and most opulent.

DRONE, a kind of large bees which make their appearance in hives about the month of May, but never work nor provide any honey, nor are at last all killed by the reft. Under the article BEES, n. 20 et seq. we have given an account of the experiments of Meifters Debraw and Schirach concerning these animals: but since that article was printed, a Treatise upon Bees has appeared by Mr Bonner concerning the little drones, and whose Management has appeared by Mr Bonner and other gentlemen for the great number of years, and who differ from the opinions of the abovementioned gentlemen for the following reasons, which we shall give in his own words. Having mentioned the opinions of Mr Debraw concerning the little drones mentioned in the article abovementioned, he proceeds thus:

"1. Can it be thought that the prying eyes of multitudes in many generations should have escaped seeing those little drones (they being according to his account, vastly numerous) thrust their posterior parts into the cells? Yet none ever saw them do it except himself; while many have seen the queen do it, though but a single bee.

"2. It is well known the queen is very long behind the wings, wife nature having made her fo, in order that the might thrust her posterior part into the cells, and yet her wings scarcely touch them, nor receive the least injury. If these imaginary little drones had to thrust their posterior parts into the cells in the same manner as the queen, certainly their wings would have been made in the same manner short, and their posterior parts long and taper, which is not the case.

Whereas were a bee of any kind (the queen excepted) to thrust its hinder part into a common cell, its wings or coats would come over its head, and be as nice like, and injure both them and its body. Besides, I scarcely think they could get into the common cells that way at any rate for want of room.

3. Mr Debraw grants, that without a queen or eggs bees will not begin to work, as well knowing they cannot propagate their species without her; and yet he says, those bees which wanted little drones began to work, and the queen laid eggs, and all went forward, till they were not impregnated, and then they gave over work, and deserted the hive. Certainly those specious creatures would have been as fertile as they wanted drones at the very first, when they were put into the hive, and that they could not do without them, as they are fertile when they want a queen, and that it is needless to begin work without her; and it might be added, that two different kinds of drones in one hive does not appear to be probable, or serve any end.

"But I shall narrate some of my own experiments on that head, which will put it, I hope, beyond dispute: On September 1st, I had a hive breeding fast; I took all her bees (among which were only four large drones, which I killed), and I put them in a hive that had nothing in her but empty combs: I waited ten days, when, by looking between the combs, I saw her have new-sealed up maggots in her cells. I then took all her bees out, and shook them into a tub full of water, and recovered them gradually; and when recovering, I prelled every one of them, in order to see if I could find any of those little drones, but could not find one; but all and every one of them had stings: they were in number 3000. After which I searched the hive I took them out of, and cut out all her combs that had eggs in them, and found they had new laid eggs, four days old eggs, and maggots in them. I then recovered the queen and all the bees, and put in the same hive again, which had not an egg in her now, and waited other twenty days, and saw her in nine days working very well; a far indication he was breeding again. I then turned her up, and cut out one of her brood-combs, and saw in it new laid eggs, four days old eggs, and maggots, and some young almost fit for emerging out of their cells.

The very same day I made another experiment: I had a hive which I had some brood-combs in her, but she had not had a large drone for four weeks before in her: she had not above 500 bees in her, which favoured me, because few in number. I took the hive into a close place in my house, in order that not a single bee should escape me: I then took all her bees out of her, and immersed them in water; and when recovering, I prelled every one of them, and each bee had a sting, as in the former experiment.

"I think the above experiments may satisfy any judicious person, that there is no such thing as little drones, unless in Mr Debraws brain. And if Mr Debraw, who can find 37 in a small swarm of bees, will send me the odd even, I will send him one of my best hives for them, and he will scarcely think he is ill paid. I add, I never saw a hive in spring, however few bees in her, but the bred some if she had a queen, though to be sure few in proportion to her bees.

By this time the reader will be very ready, no doubt, to ask me the use of the drones. I beg to be excused on that head, as I have not the least idea of their use in a hive; they do not fecundate the queen, for the can lay and breed too though the never see them. Their heat does not appear to me to be necessary for hatching the young, as they are mostly hatch ed before any are bred in a hive: and when drones are in the hive, the weather is so warm, and so many common bees in it, that they appear to have rather too much heat, by their lying out of their hives often.

I have many times had good hives with few or no drones in them all the year: and Keys is quite wrong when he says a top swarm will not do without drones in her; for I am positive to the contrary, as in the summer 1785 I took off four swarms of mine own in one day with not a single drone in any of them, and they all threw well, and bred drones in themselves about four weeks after.

Although I cannot say what use the drones are to a hive (unless it be to help away with a great deal of her honey, which they are very good at), yet the bees have them fenced in the year, they generally appearing in such about the latter end of May, and...
and the bees put a period to their lives about Lammas, at which time I give them all the assistance I can. The way they kill them is thus: They pull and bite them with their teeth, and sting them also. I have seen great havoc made of them in one day, as appeared by their lying dead before the door of the hive. But their most effectual way of killing them is their banishing them from the honey-combs; upon which the drones betake themselves to the under edges of the hives in great numbers, and to the board the hive stands on; and sometimes, though rare, I have even seen them come to the outside of the hive, and cluster there about the bulk of a man’s hand. When they are banished thus, they are very dull and lifeless: and I have lifted up a hive from the board, and there they would have been sitting close on it, with scarcely three or four common bees among them; and I have trod to death 2 or more at a time.

“We may now take a view of the disadvantages attending the old, and also Mr Drabsw’s principles on bees, were they true; and next see how a hive of bees may be preserved from coming to ruin, according to my sentiments on them.”

“The old principles on bees say, that without a queen or royal cell in a hive, it will come to ruin.”

“Mr Drabsw’s principles say, that without little drones in a hive it will come to ruin.”

“2. I say, if a hive have only new laid eggs in her (which may be easily got the greatest part of the year, in cafes she have none of her own) and common bees, she will find herself a queen, and so thrive.”

“According to the old principles, it is easily seen that in case a hive lose her queen when there is no royal cell in her, and no queen can be got to put to her (neither of which can be expected but in June and July), she is entirely ruined.”

“According to the Frenchman’s scheme, there must be drones in a hive at all times of the year to fecundate the eggs, otherwise the hive is useles. Supposing his sentiments to be true (which however can by no means be admitted, seeing there is no such thing as little drones) how perplexed would the owner be to know when there were little drones in his hive! When he wanted to make an artificial swarm, he might bring off a queen and common bees with her: but how should he come to know whether there were any, or a sufficient quantity, of little drones among them, as they cannot be distinguished from the commons but by immersing and pressuring, which would be intolerably troublesome, and next to killing the bees, and not at all practicable? All that could be done would be to hope the best, that there were little drones in her at any time of the year.”

“I say, if a queen die in a hive, and that hive have some new-laid eggs in her, or some put to her, in cafe she have none of her own, the will nourish up some of these eggs to be a queen to herself; and also by taking out a queen and some commons out of a hive (without a single drone, large or small), and putting them in an empty hive, will make a swarm, and the old hive will breed herself, a queen again if she have eggs in her.”

Drone-Phy, a two-winged insect, extremely like the common drone-bee, whence also the name.

DROPS, in meteorology, small spherical bodies which the particles of fluids spontaneously form themselves into when let fall from any height. This spheric figure, the Newtonian philosophers demonstrate to be the effect of corpuscular attraction; for considering that the attractive force of one single particle of a fluid is equally exerted to an equal distance, it must follow that other fluid particles are on every side drawn to it, and will therefore take their places at an equal distance from it, and consequently form a round superficies. See the articles Attraction, Fluid, and Rain.

DROPS, in medicine, a liquid remedy, the dose of which is estimated by a certain number of drops.

English Drops, Gutta Angusti, a name given to a chemical preparation esteemed of great virtue against vapours and lethargic affections, and purchased at soool. by king Charles II. from the inventor Dr God-dard. The medicine appeared to be only a spirit drawn by the retort from raw silk, and afterwards rectified with oil of cinnamon, or any other essential oil; and was in reality no better than the common sal volatile oleum, or any of the volatile spirits impregnated with an essential oil, except that it was less disagreeable than any of them to the taste.

DROPSY, in medicine, an unnatural collection of water in any part of the body. See (the) Index subjoined to Medicine.

DROPWORT, in botany. See Filipendula.

Water Dropwort, in botany. See Oenanthes.

DROSERA, Ros Solis, or Sun-dew, in botany: A genus of the pentagynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 14th order, Gyniales. The calyx is quinquefid, the petals five; the capsule unilocular and quinquevalved at top; the seeds very numerous. There are three species, which grow naturally in boggy places in many parts of Britain. They seem to receive the name of jun-dew from a very striking circumstance in their appearance. The leaves, which are circular, are fringed with hairs supporting small drops or globules of a pellucid liquor like dew, which continue even in the hottest part of the day and in the fullest exposure to the sun. The whole plant is acid, and sufficiently caustic to erode the skin: but some ladies know how to mix the juice with milk, so as to make it an innocent and safe application to remove freckles and sun-burn. The juice that exudes from it unmixed, will deftroy warts and corns. The plant hath the same effect upon milk that the common butterwort hath; and like that too is supposed to occasion the rot in sheep.

DROWNING, signifies the extinction of life by a total immersion in water.

In some respects, there seems to be a great similarity between the death occasioned by immersion in water, and that by strangulation, suffocation by fixed air, apoplexies, epilepsies, sudden faintings, violent shocks of electricity, or even violent falls and bruises. Physicians, however, are not agreed with regard to the nature of the injury done to the animal system in any or all of these accidents. It is indeed certain, that in all the cases abovementioned, particularly in drowning, there is very often such a suspension of the vital powers as to us hath the appearance of a total extinction of them; while yet they may be again set in motion, and the person restored to life, after a much longer sub-
Drowning, submersion than hath been generally thought capable of producing absolute death. It were to be wished, however, that as it is now universally allowed that drowning is only a suspension of the action of the vital powers, physicians could as unanimously determine the means by which these powers are suspended; because on a knowledge of these means the methods to be used for recovering drowned persons must certainly depend.

Dr de Haen, who hath written a treatise on this subject, ascribes this diversity of opinion among the physicians to their being so ready to draw general conclusions from a few experiments. Some, having never found water in the lungs, have thought that it never was there; and others, from its presence have drawn a contrary conclusion. Some have ascribed the death which happens in cases of drowning, to that species of apoplexy which arises from a great fulness of the stomach. But this opinion our author rejects, because in 13 dogs which he had drowned and afterwards dissected, no signs of such a fulness appeared. Another reason is drawn from the want of the common marks of apoplexy on the dissection of the brain, and from the actual presence of water in the lungs. He is of opinion, that the death of drowned persons happens in consequence of water getting into the lungs, and stopping the blood in the arteries. He then discusses the question how far the blowing of air into the lungs is useful in recovering drowned people. If their death is to be ascribed to the water entering the lungs, this practice, he observes, must be hurtful, as it will increase the pressure on the blood-vessels, or may even force the water into them; which, on the authority of Lewis's experiments, he alleges is possible. But, in spite of this reasoning, he afferts, that from experience it has been found useful. He allows, that the practice of suspending drowned people by the feet must be hurtful, by determining the blood too much to the head; but he observes, that remedies in some respects hurtful may be used when the advantages derived from them preponderate; and is of opinion, that the practice abovediscussed may be useful by agitating the vitals of the body, and thus returning them to their proper action. Cutting the larynx in order to admit air more freely to the lungs, he reckons to be of little or no use; but acknowledges, however, that it may sometimes prove beneficial on account of the irritation occasioned by the operation.

Dr Cullen, in his Letter to Lord Cathcart concerning the recovery of persons drowned and seemingly dead, tells us, that "From the dissection of drowned men, and other animals, it is known, that very often the water does not enter into the cavity of the lungs, nor even into the stomach, in any quantity to do hurt to the victim; and, in general, it is known, that, in most cases, no hurt is done to the organization of the vital parts. It is therefore probable, that the death which ensues, or seems to ensue, in drowned persons, is owing to the flopage of respiration, and to the ceasing, in consequence, of the circulation of the blood, whereby the body loses its heat, and, with that, the activity of the vital principle."

In the Phil. Trans. Vol. LXVI. Mr Hunter gives the following theory. The lots of motion in drowning, seems to arise from the lots of respiration; and the immediate effect this has upon the other vital motions Drowning, of the animal, at least this privation of breathing, appears to be the first cause of the heart's motion ceasing. It is most probable, therefore, Mr Hunter observes, that the restoration of breathing is all that is necessary to restore the heart's motion; for if a sufficiency of life still remains to produce that effect, we may suppose every part equally ready to move the very infant in which the action of the heart takes place, their actions depending so much upon it. What makes it very probable, that the principal effect depends upon throwing air into the lungs, is, that children in the birth, when too much time has been spent after the loss of that life which is peculiar to the female, lose altogether the disposition for the new life. In such cases there is a total suspension of the actions of life; the child remains to all appearance dead; and would, if air was not thrown into its lungs, and the first principle of action by that means restored. To put this in a clearer light, Mr. Hunter gives the result of some experiments made on a dog in 1775.—A pair of double bellows were provided, which were so constructed, that by one action air was thrown into the lungs, and by the other the air was sucked out which had been thrown in by the former, without mixing them together. The muzzle of these bellows was fixed into the trachea of a dog, and by working them he was kept perfectly alive. While this artificial breathing was going on, the femum was taken off, so that the heart and lungs were exposed to view. The heart then continued to act as before, only the frequency of its action was greatly increased. Mr Hunter then stopped the motion of the bellows; and observed that the contraction of the heart became gradually weaker and less frequent, till it left off moving altogether; but by renewing the operation, the motion of the heart also revived, and soon became as strong and frequent as before. This process was repeated upon the same dog ten times; sometimes stopping for five, eight, or ten minutes. Mr Hunter observed, that every time he left off working the bellows, the heart became extremely turgid with blood, and the blood in the left side became as dark as that in the right, which was not the case when the bellows were working. These situations of the animal, he observes, seem to be exactly similar to drowning.

Dr Edmund Goodwyn, in a treatise lately published on this subject, has endeavoured to ascertain the effects of submersion upon living animals in a more accurate manner than had hitherto been done. His first care was to determine the symptoms which took place before death; and to observe these, he procured a large glass bell in which the animals were to be immersed. Having inverted, and filled this with water, he put into it several cats, dogs, rabbits, and smaller animals, confining them among the water till they were apparently dead. In these experiments he observed, that immediately after submersion the pulse became weak and frequent; there was an apparent anxiety about the breast, and struggling to relieve it. In these struggles the animal rose to the top of the water, throwing out a quantity of air from the lungs. After this the anxiety increases, the pulse becomes weaker, and the struggles more violent; he rises again to the surface, throws out more air from the lungs, and in his efforts...
Drowning, to inspire, a quantity of water commonly passes into the mouth. The skin about the face and lips then becomes blue, the pulse ceases, the sphincters are relaxed, and the animal falls down without sense or motion. On inspecting the bodies of drowned animals, our author met with the following appearances: 1. The external surface of the brain was darker, but the vesicles of it were not more turgid than usual, nor was there any appearance of extravasation. 2. The pulmonary arteries and veins were filled with black blood, and the ventricle sinus venosus and auricle moving feebly, but the left ventricle at rest. 4. The right and left arteries of the heart, the right ventricle, and the left sinus venosus, were filled with black blood; but the left ventricle only half filled with the same, and a quantity of the same black blood was also contained in the smaller branches of the arteries proceeding from the left ventricle. This investigation was followed by a most careful and ingenious inquiry concerning the causes of the symptoms already related. To find out whether or not the entrance of water into the lungs was the cause, or whether water really entered the lungs in these cases or not, he drowned several animals among ink, and by injecting their bodies, found, that though water really did enter, it was in such small quantity that it could not be supposed capable of producing such violent effects. To ascertain this, however, more exactly than could be done by the ink, he drowned other animals in quicksilver; which, by reason of its not being miscible with the animal fluids, could be more accurately collected. By these it appeared that no more than five drachms of the fluid in which a cat was immured entered her lungs in the time of drowning; and to determine whether or not this could be the occasion of the animal’s death, he made the following experiment: Having confined a cat in an erect posture, he made a small opening in the trachea, by cutting one of the cartilaginous rings; and through this opening he introduced two ounces of water into the lungs. The only consequences were a difficulty of breathing andweak pulse; but these soon abated, and it lived several hours afterwards without any apparent inconvenience. On strangling it he found two ounces and a half of water in the lungs. On repeating the experiment with other fluids, he found the difficulty of breathing and alteration in the pulse somewhat greater; but in these instances also they abated in a few hours; and when the animals were strangled, the lungs were found to contain four ounces of fluid. From all these experiments Dr Goodwyn draws the following conclusions: 1. “A small quantity of fluid usually passes into the lungs in drowning. 2. This water enters the lungs during the efforts to inspire; and mixing with the pulmonary mucus, occasioned the frothy appearance mentioned by authors. 3. The whole of this fluid in the lungs is not sufficient to produce the changes that take place in drowning. And hence it follows, that the water produces all the changes that take place in drowning indirectly, by excluding the atmospheric air from the lungs.” This naturally leads to an investigation of the uses of respiration, and the effects of the air upon the blood and lungs in that action, which our author traces with great accuracy and very convincing experiments. He begins with attempting to determine the quantity of air drawn in at each inspiration, with the proportional quantity left after expiration. The experiments by which he endeavoured to ascertain these quantities seem to be more uncertain than the others, as indeed there are not data sufficient for them. From such as he had an opportunity of making, however, the following conclusions were deduced: 1. “The lungs contain 109 cubic inches of air after a complete expiration; and this quantity receives an additional quantity of 14 cubic inches during each inspiration. 2. The dilatation of the lungs after expiration is their dilatation after inspiration as 109 to 123. 3. The blood circulates through the pulmonary vessels in all the degrees of natural respiration. 4. The circulation through them, after expiration, is sufficiently free to keep up the health of the system.”

The last part of our author’s inquiry, viz. concerning the chemical changes produced in the air by respiration, and the effects of the air upon the blood itself, falls naturally to be considered under the article Respiration: so that here we shall only observe in general, that his experiments evidently shew that the disease produced by drowning arises entirely from the exclusion of the atmospheric air or its degenerated part; for which reason he recommends infatting the lungs with that kind of air in preference to any other. From these different views of this matter, physi­cians have differed considerably in their account of the methods to be followed in attempting the recovery of drowned persons. De Haen recommends agitation of all kinds; every kind of stimulus applied to the mouth, nose, and rectum; bleeding; heat, both by warm cloths and warm water; blowing air into the trachea; blisters, such as blisters, warm ashes, &c. applied to the head, ankles, thighs, pit of the stomach, and other parts.

Doctor Cullen’s observations on this subject are as follow. “With respect to the particular means to be employed for the recovery of drowned persons, it is to be observed, in the first place, That such as were recommended and practised, upon a supposition that the suffocation was occasioned by the quantity of water taken into the body, and therefore to be evacuated again, were very unhappily advised. The hanging up of persons by the heels, or setting them upon the crown of the head, or rolling the body upon a cask, were generally practised, upon a supposition altogether false; or upon the suffocation of a cafe which, if real, is apprehended to be irrecoverable. At the same time, these practices were always attended with the danger of bursting some vesels in the brain or lungs, and of rendering thereby some cases incurable that were not so from the drowning alone. All such practices, therefore, are now very properly disapproved of and forbid.

“Of those cases in which the body has not been long in the water, and in which therefore the natural heat not entirely extinguished, nor the irritability of the moving fibres greatly impaired, it is possible that a good deal of agitation of the body may be the only means necessary to restore the action of the vital or

organ.
Drowning; gans: but in other cases, where the heat and irritability have ceased to a greater degree, it is to me very doubtful, if much agitation can be safe, and if any degree of it can be useful, till the heat and irritability are in some measure restored. In all cases, any violent concussion cannot be safe, and, I believe, is never necessary. It may be proper here to observe also, that in transporting the body from the place where it is taken out of the water, to the place where it may be necessary for applying the proper means of its recovery, all postures exposing to any improper compression, as that of the body's being carried over a man's shoulder, are to be avoided. The body is to be kept stretched out, with the head and upper parts a little raised; and care is to be taken to avoid the neck's being bent much forward. In this manner, laid upon one side, and upon some straw in a cart, it may be most properly conveyed; and the agitation which a pretty brisk motion of the cart may occasion, will, in most cases, do no harm.

From the account I have given above of the causes, or of the appearances, of death, in drowned persons, it is evident, that the first step to be taken for their recovery is to restore the heat of the body, which is absolutely necessary to the activity of the moving fibres. For this purpose, the body, as soon as possible, is to be stripped of its wet clothes, to be well dried, and to be wrapped up in dry, and (if possible) warm, coverings: and it is to be wished, in all cases, as soon as the report of a person's being drowned is heard, that blankets should be immediately carried to the water-side; so that, as soon as the body is got out of the water, the change of covering just now mentioned may be instantly made; or, if the body has been naked when drowned, that it may be immediately dried, and defended against the cold of the air. Besides covering the body with blankets, it will be further of advantage, if it can be done without loss of time, to cover the drowned body with a warm shawl, or waffcoat immediately taken from a living person.

When, at the time of a person's being drowned, it happens that the sun shines out very hot, I think there can be no better means of recovering the heat, than by exposing the naked body, in every part, to the heat of the sun; while, at the same time, all other means necessary or useful for the recovery of life are also employed.

When the heat of the sun cannot be employed, the body should be immediately transported to the nearest house that can be got convenient for the purpose: the first wish will be one that has a tolerably large chamber, in which a fire is ready, or can be made; and if possible, the house should afford another chamber, in which also a fire can be provided.

When the drowned body is brought into such house, and care is at the same time taken that no more people are admitted than are absolutely necessary to the service of the drowned person, every endeavour must be immediately employed for recovering the heat of the body, and that by different measures, as circumstances shall direct.

If, in the neighbourhood of the place, there be any brewery, distillery, dyery, or fabric which gives an opportunity of immediately obtaining a quantity of warm water and a convenient vessel, there is nothing more proper than immersing the body in a warm bath. Even where a sufficient quantity of warm water cannot be had at once, the bath may be thus practiced, if the accident has happened in or very near a town or village, when a great many fires may be at once employed in heating small quantities of water; for in this way the necessary quantity may be soon obtained. To encourage this practice, it is to be observed, that one part of boiling water is more than sufficient to give the necessary heat to two parts of spring or sea water, as it is not proper to apply the bath at first very warm, nor even of the ordinary heat of the human body, but somewhat under it; and, by the addition of warm water, to bring it gradually to a heat very little above it.

If the drowned body be of no great bulk, it may be conveniently warmed by a person's lying down in bed with it, and taking it near to their naked body, changing the position of it frequently, and at the same time chafing and rubbing with warm cloths the parts which are not immediately applied to their warm body.

If none of these measures can be conveniently practiced, the body is to be laid upon a bed before a moderate fire, and frequently turned, to expose the different parts of it; and thus, by the heat of the fire gradually applied, and by rubbing the body well with coarse towels, or other cloths well warmed, pains are to be taken for restoring its heat. This will be promoted by warm cloths applied and frequently renewed under the hams and arm-pits; and by hot-bricks, or bottles of warm water, laid to the feet.

In the practice of rubbing, it has been proposed to moisten the cloths applied with camphorated spirits, or other such stimulating substances: but I think this might prove an impediment to the rubbing; and I would not recommend any practice of this kind, except, perhaps, the application of the vinous spirit of fat ammoniac to the wrists and ankles only.

For recovering the heat of the body, it has been proposed to cover it all over with warm grains, ashes, sand, or salt; and where these, sufficiently warm, are ready at hand, they may be employed; but it is very seldom they can be obtained, and the application might often interfere with other measures that may be necessary. All therefore that I can propose, with respect to the use of these, is to observe, that bags of warm and dry salt may be among the most convenient applications to the feet and hands of drowned persons; and the quantity necessary for this purpose may be got by quickly by heating the salt in a frying-pan over a common fire.

While these measures are taking for recovering the heat, means are at the same time to be employed for restoring the action of the moving fibres. It is well known, that the intestines are the parts of the body which, both from their internal situation and peculiar constitution, retain the longest their irritability; and therefore, that, in drowned persons, stimulants applied may have more effect upon the intestines than upon other parts. The action, therefore, of the intestines is to be supported or renewed as soon as possible; as the reftoring and supporting the action of such a consid
Drowning: a considerable portion of moving fibres as those of the intestines, must contribute greatly to restore the activity of the whole system.

For exciting the action of the intestines, the most proper means is, the application of their ordinary stimulus of dilatation; and this is most effectually applied, by forcing a quantity of the air into them by the fundamental. Even the blowing in cold air has been found useful; but it will certainly be better if heated air can be employed; and further, that air can be impregnated with something, which, by its acrimony also, may be powerful in stimulating the intestines.

From all these considerations, the smoke of burning tobacco has been most commonly applied, and has upon many occasions proved very effectual. This will be most properly thrown in by a particular apparatus, which, for other purposes as well as this, should be in the hands of every surgeon; or at least should, at the public expense, be at hand in every part of the country where drownings are likely to happen. With regard to the use of it, I have to observe, that till the tobacco is kindled in a considerable quantity, a great deal of cold air is blown through the box and tube; and as that, as hinted above, is not so proper, care should be taken to have the tobacco very well kindled, and to blow through it very gently, till the heated smoke only paffes through. If, upon certain occasions, the apparatus referred to should not be at hand, the measure however may be executed by a common tobacco pipe, in the following manner: A common glyster-pipe that has a bag mounted upon it, is to be introduced into the fundament, and the mouth of the bag is to be applied round the small end of a tobacco-pipe. In the bowl of this, tobacco is to be kindled; and, either by a playing card made into a tube and applied round the mouth of the bowl, or by applying upon this the bowl of another pipe that is empty, and blowing through it, the smoke may be thus forced into the intestines, and, in a little time, in a considerable quantity.

If none of these means for throwing in the smoke can be employed, it may be useful to inject warm water to the quantity of three or four English pints. This may be done by a common glyster-bag and pipe, but better by a large syringe; and it may be useful to dissolve in the water some common salts, in the proportion of half an ounce to an English pint; and also, to add to it some wine or brandy.

While these measures for recovering the heat of the body and the activity of the moving fibres are employed, and especially after they have been employed for some time, pains are to be taken to complete and finish the business, by restoring the action of the lungs and heart.

On this subject, I am obliged to my learned and ingenious colleague Dr Monro, who has made some experiments for ascertaining the best manner of inflating the lungs of drowned persons. By these experiments he finds it may be more conveniently done by blowing into one of the nostrils, than by blowing into the mouth. For blowing into the nostril, it is necessary to be provided with a wooden pipe, fitted at one extremity for filling the nostril, and at the other for being blown into by a person’s mouth, or for receiving the pipe of a pair of bellows, to be employed for the

fame purpose. Doctor Monro finds, that a person of ordinary strength can blow into such a pipe, with a sufficient force to inflate the lungs to a considerable degree; and thinks the warm air from the lungs of a living person will be most conveniently employed at first; but when it is not soon effectual in restoring the respiration of the drowned person, and that a longer continuance of the inflation is necessary, it may be proper to employ a pair of bellows, large enough at once to contain the quantity of air necessary to inflate the lungs to a due degree.

Whether the blowing-in is done by a person’s mouth, or by bellows, Dr Monro observes, that the air is ready to pass by the gullet into the stomach; but that this may be prevented, by pressing the lower part of the larynx backwards upon the gullet. To persons of a little knowledge in anatomy, it is to be observed, that the pressure should be only upon the cricoid cartilage, by which the gullet may be flattened, while the passage through the larynx is not interrupted.

When, by blowing thus into the nostril, it can be perceived, by the raising of the chest or belly, that the lungs are filled with air, the blowing in should cease; and by pressing the breast and belly, the air received into the lungs should again expel’d; then the blowing and expulsion should be again repeated; and thus the practise is to be continued, as so to imitate, as exactly as possible, the alternate motions of natural respiration.

It is hardly necessary to observe, that when the blowing into the nostril is practised, the other nostril and the mouth should be accurately closed.

If it should happen that in this practice the air does not seem to pass readily into the lungs, Doctor Monro informs me it is very practicable to introduce directly into the glottis and trachea a crooked tube, such as the catheter used for a male adult. For this he offers the following directions: The surgeon should place himself on the right side of the patient; and, introducing the forefinger of his left hand at the right corner of the patient’s mouth, he should push the point of it behind the epiglottis; and using this as a directory, he may enter the catheter, which he holds in his right hand, at the left corner of the patient’s mouth, till the end of it is passed beyond the point of his forefinger; and it is then to be let fall, rather than pushed into the glottis; and through this tube, by a proper syringe applied to it, air may be with certainty blown into the lungs. I observe, that some such measure had been proposed by Mounf. le Cat in France; but I have not learned that it has ever been put in practice, and I am afraid it may be attended with several difficulties, and must be left to the dexterity of surgeons, who may be properly provided and instructed for this purpose.

For throwing air with more certainty into the lungs, it has been proposed to open the windpipe in the same manner as is done in the operation which the surgeons call bronchotomy, and by this opening to blow into the lungs; and when the blowing into the nostril does not seem to succeed, and a skilful operator is at hand, I allow that the measure may be tried; but I can hardly suspect, that it will be of any advantage when the blowing in by the nostril has entirely failed.

It is to be hoped, that by blowing into the lungs one way or other, even a quantity of water which had been
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been taken into the lungs may be again washed out; and the same seems to be the only effectual means of washing out that frothy matter which is found to fill the lungs of drowned persons, and which proves, if I mistake not, the most common cause of their mortal suffocation. This practice, therefore, is to be immediately entered upon, and very avidly continued for an hour or two together.

"I have now mentioned the measures chiefly to be pursued and depended upon for the recovery of drowned persons; but must still mention some others that may prove considerable help to it.

"One of these is, the opening the jugular veins to relieve the congestion, which almost constantly occurs in the veins of the head, and is probably a frequent cause of the death of drowned persons. For relieving this congestion, the drawing some blood from the jugulars, very early, may certainly be of service; and it will be particularly indicated by the livid and purple colour of the face. It may even be repeated, according to the effect; it seems to have in taking off that suffocation, but when the drowned person is in some measure recovered, and some motion of the blood is restored, it will be proper to be very cautious in making this evacuation, and at least to take care not to push it so far as to weaken too much the recovering, but still weak, powers of life.

"Another measure for recovering the activity of the vital principle, is the application of certain stimulants to the more sensible parts of the body, such as holding the quick-time spirit of sal ammoniac to the nose, or putting a little of it upon a rag into the nostrils. It has been usual to pour some liquors into the mouth; but it is dangerous to pour in any quantity of liquid, till it appear that the power of swallowing is in some measure restored.

"When a surgeon is at hand, and is provided with proper apparatus, a crooked pipe may be introduced into the gullet; and by this a glass or two of warm wine may be poured down into the stomach, and probably with advantage. But when no such apparatus is at hand, or surgeon to employ it, and the power of swallowing is still doubtful, the trial of pouring liquids into the mouth should be made by a small quantity of warm water alone; and when, from such trial, the power of swallowing shall appear to be recovered, it may then be allowable to favour the further recovery of the person, by pouring in some wine or brandy. In short, till some marks of the recovery of swallowing and respiration appear, it will not be safe to apply any stimulants to the mouth; excepting that of a few drops of some acid substance to the tongue, and which are not of bulk enough to slide back upon the glottis: I can think of no stimulant more conveniently and safely to be applied to the mouth and nostrils, than a moderate quantity of tobacco-smoke blown into them.

"Though I do not imagine that drowned persons are ever hurt by the quantity of water taken into their stomach, yet, as a stimulus applied to the stomach, and particularly as the action of vomiting proves a stimulus to the whole system, I can have no objection to the French practice of throwing in an emetic as soon as any swallowing is restored. For this purpose, I would successively throw in some tea-spoonfuls of the ipecacuanha wine; and when it does not interfere with other necessary measures, the fauces may be gently irritated by an oiled feather thrust into them.

With regard to the stimulants, I must conclude with observing, That when a body has lain but for a short time in the water, and that therefore its heat and irritability are but little impaired, the application of stimulants alone has been often found effectual for the recovery: but, on the contrary, when the body has lain long in the water, and the heat of it is very much extinguished, the application of any other stimulants than that of tobacco-smoke to the intestines can be of very little service; and the application of others ought never to interfere with the measures for recovering heat and the motion of respiration.

"With respect to the whole of these practices, I expect, from the principles upon which they are in general recommended, it will be understood, that they are not to be soon discontinued, though their effects do not immediately appear. It is obvious, that in many cases, it may be long before the heat of the body, and the activity of the vital principle, can be restored; and though, in a longer time, it may very possibly be accomplished. In fact, it has often happened, that the means employed for one hour have not succeeded, the same continued for two or more hours, have at length had the wished for effects. It should therefore be a constant rule, in this business, that the proper means should be employed for several hours together; unless it happen, that, while no symptoms of returning life appear, the symptoms of death shall, at the same time, go on constantly increasing.

"In the whole of the above I have kept in view chiefly the case of drowned persons: but it will be obvious, that many of the measures proposed will be equally proper and applicable in other cases of suffocation, as those from strangling, the damps of mines, the fumes of charcoal, &c.; and a little attention to the difference of circumstances will lead to the measures most proper to be employed."
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principle, he thinks, owes its vigour. From experiments, he says, it appears to be a law in animal bodies, that the degree of heat should bear a proportion to the quantity of life: as life is weakened, this proportion requires great accuracy, while greater powers of life allow it greater latitudes.

After these and several other observations on the same subject, our author proceeds to more particular directions for the management of drowned people.

If bed-cloaths are put over the person, so as scarce to touch him, streams of volatile alkali, or of warm balsams, may be thrown in, so as to come in contact with many parts of the body. And it might probably be advantageous, Mr. Hunter observes, to have streams of the same kind conveyed into the stomach. This, we are told, may be done by a hollow bougie and a syringe; but the operation should be very speedily performed, as the instrument, by continuing long in the mouth, might produce sickness, which our author says he would always wish to avoid.

Some of the warm stimulating substances, such as juice of horse-radish, peppermint water, and spirits of hartshorn, are directed to be thrown into the stomach in a fluid state, as also to be injected by the anus. Motion possibly may be of service; it may at least be tried: but as it hath less effect than any other of the usually preferred stimulants, it is directed to be the last part of the process.

The fame care in the operator, in regulating the proportion of every one of these means, is here directed, as was formerly given for the application of heat. For every one of them, our author observes, may possibly have the same property of destroying entirely the feeble action which they have excited, if administered in too great a quantity: instead, therefore, of increasing and hastening the operations on the first signs of returning life being observed, as is usually done, he desires they may be lessened; and advises their increase to be afterwards proportioned, as nearly as possible, to the quantity of powers as they arise.

When the heart begins to move, the application of air to the lungs should be lessened, that, when the mucus of respiration begin to act, a good deal may be left for them to do.

Mr. Hunter absolutely forbids blood-letting in all such cases; for, as it not only weakens the animal principle, but leaffens life itself, it must consequently, he observes, lessen both the powers and dispositions to action. For the same reason, he is against introducing any thing into the stomach that might produce sickness or vomiting; and, on the same principle, he says, we should avoid throwing tobacco fumes, or any other such articles, up by the anus, as might tend to an evacuation that way.

The following is a description of instruments recommended for such operations by our author.

First. A pair of bellows, fo contrived, with two separate cavities, that, by opening them when applied to the nostrils or mouth of a patient, one cavity will be filled with common air, and the other with air sucked out from the lungs, and by shutting them again, the common air will be thrown into the lungs, and that sucked out of the lungs discharged into the room. The pipe of these should be flexible; in length a foot, or a foot and an half; and, at least, three-eighths of an inch in width. By this the artificial breathing may be continued, while the other operations, the application of the stimulants to the stomach excepted, are going on, which could not be conveniently done if the muzzle of the bellows were introduced into the nose. The end next the nose should be double, and applied to both nostrils. Secondly, A syringe, with a hollow bougie, or flexible catheter, of sufficient length to go into the stom.ach, and convey any stimulating matter into it, without affecting the lungs. Thirdly, A pair of small bellows, such as are commonly used in throwing fumes of tobacco up by the anus.

Notwithstanding the differences in theory, however, between the physicians abovementioned, it is certain, that within these few years great numbers of drowned people have been restored to life by a proper use of the remedies we have enumerated, and societies for the recovery of drowned persons have been instituted in different places. The first society of this kind was instituted in Holland, where, from the great abundance of canals and inland seas, the inhabitants are particularly exposed to accidents by water. In a very few years 450 persons were saved from death by this society; and many of these had continued upwards of an hour without any signs of life, after they had been taken out of the water. The society was instituted at Amsterdam in 1767: and, by an advertisement, informed the inhabitants of the United Provinces of the methods proper to be used on such occasions; offering rewards at the same time to those who should, with or without success, use those methods for recovering persons drowned and seemingly dead. The laudable and humane example of the Dutch was followed in the year 1768 by the magistrates of health in Milan and Venice; afterwards by the magistrates of Hamburg in the year 1771, by those of Paris in the year 1772, and by the magistrates of London in 1774.

The following directions are given for the recovery of drowned persons by the society at London.

I. As soon as the patient is taken out of the water, the wet cloaths, if the person is not naked at the time of the accident, should be taken off with all possible expedition on the spot (unless some convenient house be very near), and a great-coat or two, or some blankets if convenient, should be wrapped round the body.

II. The patient is to be thus carefully conveyed in the arms of three or four men, or on a bier, to the nearest public or other house, where a good fire, if in the winter season, and a warm bed, can be made ready for its reception. As the body is conveying to this place, great attention is to be paid to the position of the head; it must be kept supported in a natural and easy posture, and not suffered to hang down.

III. In cold or moif weather, the patient is to be laid on a matras or bed before the fire, but not too near, or in a moderately heated room: in warm and sultry weather, on a bed only. The body is then to be wrapped as expeditiously as possible with a blanket, and thoroughly dried with warm coarse cloths or flannels.

IV. In summer or sultry weather too much air cannot be admitted. For this reason it will be necessary to let open the windows and doors, as cool refreshing air is of the greatest importance in the process of resuscitation.
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V. Not more than six persons are to be present to apply the proper means; a greater number will be useless, and may retard, or totally prevent, the restoration of life, by rendering the air of the apartment unwholesome. It will be necessary, therefore, to requite the absence of those who attend merely from motives of curiosity.

VI. As proper for one of the assistants, with a pair of bellows of the common size, applying the pipe a little way upon one nostril, to blow with some force, in order to introduce air into the lungs; at the same time the other nostril and the mouth are to be closed by another assistant, whilst a third person gently presses the chest with his hands, after the lungs are observed to be inflated. By pursuing this process, the noxious vapours will be expelled, and natural breathing imitated. If the pipe of the bellows be too large, the air may be blown in at the mouth, the nostrils at the same time being closed, so that it may not escape that way; but the lungs are more easily filled, and natural breathing better imitated, by blowing up the nostril.

VII. Let the body be gently rubbed with common salt, or with flannel, sprinkled with spirits, as rum or grog. A warming-pan heated (the body being surrounded with flannel) may be lightly moved up and down the back. Fomentations of hot brandy are to be applied to the pit of the stomach, loins, &c. and often renewed. Bottles filled with hot water, heated tiles covered with flannel, or hot bricks, may be efficaciously applied to the soles of the feet, palms of the hands, and other parts of the body. The temples may be rubbed with spirits of hartshorn, and the nostrils now and then tickled with a feather; and fluff, or eau de luce, should be occasionally applied.

VIII. Tobacco fumes should be thrown up the fundament; if a fumigator be not at hand, the common pipe may answer the purpose. The operation should be frequently performed, as it is of importance; for the good effects of this process have been experienced in a variety of instances of suffused animation. But should the application of tobacco-smoke in this way not be immediately convenient, or other impediments arise, clysters of this herb, or other acrid infusions with salt, &c. may be thrown up with advantage.

IX. When these means have been employed a considerable time without success, and any brewhouse or warm bath can be readily obtained, the body should be carefully conveyed to such a place, and remain in the bath, or surrounded with warm grins, for three or four hours.

If a child has been drowned, its body should be wiped perfectly dry, and immediately placed in bed between two healthy persons. The salutary effects of the natural vital warmth, conveyed in this manner, have been proved in a variety of successful cases.

X. While the various methods of treatment are employed, the body is to be well shaken every ten minutes, in order to render the process of animation more certainly successful; and children, in particular, are to be much agitated, by taking hold of their legs and arms frequently and for a continuance of time. In various instances agitation has forwarded the recovery of boys who have been drowned, and continued for a considerable time apparently dead.

XI. If there be any signs of returning life, such as sighing, gasping, or convulsive motions, a spoonful of any warm liquid may be administered; and if the act of swallowing is returned, then a cordial of warm brandy or wine may be given in small quantities and frequently repeated.

XII. Electricity may be tried by the judicious and skilful, as its application neither prevents nor retards the various modes of recovery already recommended; but, on the other hand, will most probably tend to render the other means employed more certainly and more expeditiously efficacious. This stimulus bids fair to prove an important auxiliary in cases of suspended animations; and therefore deserves the serious regard and attention of the Faculty.

The methods which have been fully described, are to be employed with vigour for three hours or upwards, although no favourable circumstances should arise; for it is a vulgar and dangerous opinion to suppose that persons are irrecoverable, because life does not make its appearance; an opinion that has configned to the grave an immense number of the seemingly dead, who might have been restored to life by resolation and perseverance.

Bleeding is never to be employed in such cases, unless by the direction of one of the medical assistants, or some other gentleman of the faculty who has paid attention to the refuscitating art.

DRUG, a general term for goods of the druggist and grocery kinds, especially those used in medicine and dyeing. See Materia Medica, Pharmacy, and Dyeing.

DRUGGET, in commerce, a stuff sometimes all wool, and sometimes half wool half thread, sometimes corded, but usually plain. Those that have the wool of wood, and the warp of thread, are called threaded druggets; and those wrought with the shuttle on a loom of four marches, as the ferges of Moni, Beauvais, and so forth, are called corded druggets. As to the plain, they are wrought on a loom of two marches, with the shuttle, in the same manner as cloth, camblets, and other like stuffs not corded.

DRUID, or DRUID, (anc. geog.), a very ancient town, the principal place of the Druides or Druidæ in Gaul, as they are called (Cæsar, Cicero). Now Drua in the Orleanois. Here they met every year in a consecrated grove, according to Cæsar. The town was also called Durocassii. W. Long. i. 21. Lat. 48. 45.

DRUIDS, DRUIDES, or DRUIDÆ, the priests or ministers of religion among the ancient Celtæ or Gauls, Britons, and Germans. Some authors derive the word from the Hebrew דרווים drusim, or drosim, which they translate contemplatores. Picard, Celtopoe. lib. ii. p. 58, believes the druids to have been thus called from Druis, or Dryius, their leader, the fourth or fifth king of the Gauls.

(1) Dr. Fothergill of Bath, in a letter to the Regifter, advices as a potent and active stimulus the patent mustard modified with spirits.
The druids were the religious leaders of the ancient Celts. They were known for their knowledge in astrology, geometry, natural philosophy, and other sciences. The druids had one chief, or arch-druid, in every nation. They had absolute authority over the rest of the druids and were called on by the people for guidance in religious matters.

The druids were chosen from among the Gauls and Britons and were chosen from the best families. They served as religious leaders and were known for their wisdom and knowledge. They were often called upon to officiate at religious ceremonies and to interpret the will of the gods.

The druids were known for their knowledge of the stars and the heavens, and they were said to be able to see into the future. They were also known for their work in astrology and for their knowledge of the stars and the heavens.

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Druids cared this sacred plant, he descended the tree; the bulls were sacrificed; and the deity invoked to bless his own gift, and render it efficacious in those distempers in which it should be administered.

The consecrated groves, in which they performed their religious rites, were fenced round with stones, to prevent any person’s entering between the trees, except through the passages left open for that purpose, and which were guarded by some inferior druids, to prevent any stranger from intruding into their mysteries. These groves were of different forms; some quite circular, others oblong, and more or less capacious as the votaries in the districts to which they belonged were more or less numerous. The area in the centre of the grove was encompassed with several rows of large oaks set very close together. Within this large circle were several smaller ones surrounded with large stones; and near the centre of these smaller circles, were stones of a prodigious size and convenient height, on which the victims were slain and offered. Each of these being a kind of altar, was surrounded with another row of stones, the use of which cannot now be known, unless they were intended as inclosures to keep the people at a convenient distance from the officiating priest.

Suetonius, in his life of Claudius, affirms us the druids sacrificed men; and Mercury is said to be the god to whom they offered these victims. Diodorus Siculus, lib. vi. observes it was only upon extraordinary occasions they made such offerings; as, to consult what measures to take, to learn what should befall them, &c. by the fall of the victim, the terrors of his members, and the manner of his blood gushing out. Augustus condemned the custom, and Tiberius and Claudius punished and abolished it.

We learn from Cæsar, that the druids were the judges and arbiters of all differences and disputes, both public and private; they took cognizances of murders, inheritances, boundaries, and limits; and decreed rewards and punishments. Such as disobeyed the decrees they excommunicated, which rendered them malefactors, and which were guarded by some superior druids, to prevent any stranger from intruding into their mysteries. These groves were of different forms; some quite circular, others oblong, and more or less capacious as the votaries in the districts to which they belonged were more or less numerous. The area in the centre of the grove was encompassed with several rows of large oaks set very close together. Within this large circle were several smaller ones surrounded with large stones; and near the centre of these smaller circles, were stones of a prodigious size and convenient height, on which the victims were slain and offered. Each of these being a kind of altar, was surrounded with another row of stones, the use of which cannot now be known, unless they were intended as inclosures to keep the people at a convenient distance from the officiating priest.

Suetonius, in his life of Claudius, affirms us the druids sacrificed men; and Mercury is said to be the god to whom they offered these victims. Diodorus Siculus, lib. vi. observes it was only upon extraordinary occasions they made such offerings; as, to consult what measures to take, to learn what should befall them, &c. by the fall of the victim, the terrors of his members, and the manner of his blood gushing out. Augustus condemned the custom, and Tiberius and Claudius punished and abolished it.

We learn from Cæsar, that the druids were the judges and arbiters of all differences and disputes, both public and private; they took cognizances of murders, inheritances, boundaries, and limits; and decreed rewards and punishments. Such as disobeyed the decrees they excommunicated, which was their principal punishment; the criminal being hereby excluded from all public assemblies, and avenged by all the world, so that nobody durst speak to him for fear of being polluted. Strabo observes, they had sometimes interest and authority enough to stop armies upon the point of engaging, and accommodate their differences.

It hath been disputed, whether the druids were the inventors of their opinions and systems of religion and philosophy, or received them from others. Some have imagined, that the colony of Phocians which left Greece and built Marcellus in Gaul about the 5th Olympiad, imported the first principles of learning and philosophy, and communicated them to the Gauls and other nations in the west of Europe. It appears, indeed, that this famous colony contributed not a little to the improvement of that part of Gaul where it settled, and to the civilization of its inhabitants. “The Greek colony of Marcellus, (says Justin) civilized the Gauls, and taught them to live under laws; to build cities and inclose them with walls; to raise corn; to cultivate the vine and olive; and, in a word, made so great a change both in the face of the country and the manners of its inhabitants, that Gaul seemed to be transplanted into Greece, rather than a few Greeks transplanted into Gaul.” But though we may allow that the druids of Gaul and Britain borrowed some hints and embellishments of their philosophy from this Greek colony, and perhaps from other quarters, we have reason to believe that the substance of it was their own. Others have suggested, that the druids derived their philosophy from Pythagoras, who published his doctrines at Croton in Italy; where he lived in the most reputation for his virtue, wisdom, and learning, above 20 years. This conjecture is very much confirmed by this remarkable exprefion of Ammianus Marcellinus, “That the druids were formed into fraternities, as the authority of Pythagoras decreed.” It hath been also observed, that the philosophy of the druids bore a much greater resemblance to that of Pythagoras than to that of any of the other sages of antiquity. But it seems probable, that Ammianus meant no more by the above exprefion than to illustrate the nature of the druidical fraternities, by comparing them to those of the Pythagoreans, which were well known to the Romans; and the resemblance between the Pythagorean and druidical philosophy may perhaps be best accounted for by supposing, that Pythagoras learned and adopted some of the opinions of the druids, as well as imparted to them some of his discoveries. It is well known, that this philosopher, animated by the most ardent love of knowledge, travelled into many countries in pursuit of it, and got himself admitted into every society that was famous for its learning. It is therefore highly probable in itself, as well as directly affected by several authors, that Pythagoras heard the druids of Gaul, and was initiated into their philosophy.

From the concurring testimonies of several authors, it appears that physiology, or natural philosophy, was the favourite study of the druids of Gaul and Britain. Cicero tells us that he was personally acquainted with one of the Gaulish druids, Divinitus, the Edun, a man of quality in his country, who professed to have a thorough knowledge of the laws of nature, or that science which the Greeks call physis or physiology. According to Diodorus, Strabo, Cæsar, Mela, Ammianus Marcellinus, and others, they entered into many disquisitions and disputations in their schools, concerning the form and magnitude of the universe in general, and of this earth in particular, and even concerning the most sublime and hidden secrets of nature. On these and the like subjects they formed a variety of systems and hypotheses; which they delivered to their disciples in verse, that they might the more easily retain them in their memories, since they were not allowed to commit them to writing. Strabo hath preferred one of the physiological opinions of the druids concerning the universe; viz. that it was neither to be entirely destroyed or annihilated, but was to undergo a succession of great changes and revolutions, which were to be produced sometimes by the power and predominancy of water, and sometimes by that of fire. This opinion, he intimates, was not peculiar to them, but was entertained also by the philosophers of other nations; and Cicero speaks of it as a truth universally acknowledged and undeniable. “It is impossible for us (says he) to attain a glory that is eternal, or even of very long duration, on account of those deluges and confagurations of the earth..."
Druids. earth which must necessarily happen at certain periods.” This opinion, which was entertained by the most ancient philosophers of many different and very distant nations, was probably neither the result of rational enquiry in all these nations, nor communicated from one of them to others; but descended to them all from their common ancestors of the family of Noah by tradition, but corrupted and misunderstood through length of time. The agreement of the druids with the philosophers of so many other nations in this opinion about the alternate dissolution and renovation of the world, gives us reason to believe, that they agreed also in their opinion of its origin from two distinct principles; the one intelligent and omnipotent, which was God; the other inanimate and inactive, which was matter. We are told by Cæsar, that they had many disquisitions about the power of God; and, no doubt, amongst other particulars, about his creating power. But whether they believed with some that matter was eternal, or with others that it was created, and in what manner they endeavoured to account for the disposition of it into the present form of the universe, we are entirely ignorant, though they certainly had their speculations on these points. We are only informed, that they did not express their sentiments on these and the like heads in a plain and natural, but in a dark, figurative, and enigmatical manner. This might incline us to suspect, that Pythagoras had borrowed from them his doctrine about numbers, to whose mystical energy he ascribes the formation of all things; for nothing can be more dark and enigmatical than that doctrine. The druids disputed likewise about the magnitude and form of the world in general, and of the earth in particular, of which things they pretended to have a perfect knowledge. We know not what their opinions were about the dimensions of the universe or of the earth, but we have several reasons to make us imagine that they believed both to be of a spherical form. This is visibly the shape and form of the sun, moon, and stars, the most conspicuous parts of the universe; from whence it was natural and easy to infer, that this was the form of the world and of the earth. Accordingly this seems to have been the opinion of the philosophers of all nations; and the circle was the favourite figure of the druids, as appears from the form both of their houses and places of worship. Besides these general speculations about the origin, dissolution, magnitude, and form of the world and of the earth, the druids engaged in particular inquiries into the natures and properties of the different kinds of substances. But all their discoveries in this most useful and extensive branch of natural philosophy, whatever they were, are entirely lost.

Astronomy also appears to have been one of the chief studies of the druids of Gaul and Britain. “The druids (says Cæsar) have many disquisitions concerning the heavenly bodies and their motions, in which they instruct their disciples.” Mela, speaking of the same philosophers, observes, “That they profess to have great knowledge of the motions of the heavens and of the stars.” Some knowledge of this science indeed was not only necessary for measuring time in general, marking the duration of the different feasons, regulating the operations of the husbandman, directing the course of the mariner, and for many other purposes in civil life; but it was especially necessary for fixing the times and regular returns of their religious solemnities, of which the druids had the sole direction. Some of these solemnities were monthly, and others annual. It was therefore necessary for them to know, with some tolerable degree of exactness, the number of days in which the sun and moon performed their revolutions, that these solemnities might be observed at their proper seasons. This was the more necessary, as some of these solemnities were attended by perjuries from different and very distant countries, who were all to meet at one place on one day; who must have had some rule to discover the annual return of that day.

The most perceptible division of time by the two Their mean luminaries is into day and night; the former occasioned by the presence of the sun above the horizon, the latter by his absence, which is in some measure supplied by the moon and stars. The druids computed their time by nights, and not by days; a custom which they had received from their most remote ancestors by tradition, and in which they were confirmed by their measuring their time very much by the moon, the months, and queen of nights. As the changes in the aspect of that luminary are most conspicuous, they engaged the attention of the most ancient astronomers of all countries, and particularly of the druids, who regulated all their great solemnities, both sacred and civil, by the age and aspect of the moon. “When no unexpected accident prevents it, they assemble upon stated days, either at the time of the new or full moon; for they believe these to be the most auspicious times for transacting all affairs of importance.” Their most august ceremony of cutting the mistletoe from the oak by the archdruid, was always performed on the sixth day of the moon. Nay, they even regulated their military operations very much by this luminary, and avoided as much as possible, to engage in battle while the moon was on the wane. At the attention of the druids was so much fixed on this planet, it could not be very long before they discovered that the passing through all her various aspects in about thirty days; and by degrees, and more accurate observations, they would find, that the real time of her performing an entire revolution was very nearly 29; days. This furnished them with the division of their time into months, or revolutions of the moon; of which we know with certainty they were posseted. But this period, though of great use, was evidently too short for many purposes, and particularly for measuring the seasons, which they could not fail to perceive depended on the influences of the sun. By continued observation they discovered, that about 12 revolutions of the moon included all the variety of seasons, which began again, and revolved every 12 months. This suggested to them that larger division of time called a year, consisting of 12 lunations, or 354 days, which was the most ancient measure of the year in almost all nations. That this was for some time at least the form of the druidical year, is both probable in itself, and from the following expression of Pliny: “That they began both their months and years, not from the change, but from the sixth day of the moon.” This is even a demonstration that their years consisted of a certain number of lunar revolutions, as they always commenced on the same day of
Druids. of the moon. But as this year of 12 lunar months falls 11 days and nearly one-fourth of a day short of a real revolution of the sun, this error would soon be perceived, and call for reformations; though we are not informed of the particular manner in which it was rectified. Various arguments might be collected to make it very probable that the Britons were acquainted with a year exact enough for every purpose of life, when they were first invaded by the Romans; but it will be sufficient to mention one, which is taken from the time and circumstances of that invasion. The learned Dr Halley hath demonstrated that Caesar arrived in Britain, in his first year's expedition, on the 26th day of August; and Caesar himself informs us, that at his arrival the harvest was in full, except in one field, which by some means or other was more backward than the rest of the country. This is a proof that the Britons husbandmen knew and used the most proper seasons for ploughing, sowing, and reaping. The druids, as we are told by Pliny, had also a cycle or period of 30 years, which they called an age, and which commenced like a wife on the sixth day of the moon; but that author hath not acquainted us on what principles this cycle was formed, nor to what purposes it was applied. We can hardly suppose that this was the cycle of the sun, which consists of 28 years, and regulates the dominical letters. It is more probable, that while the druids made use of the year of 12 lunar months, and had not invented a method of adjusting it to the real revolution of the sun, they observed that the beginning of this year had passed through all the feasons, and returned to the point from whence it first put out, in a course of about 33 years; which they might therefore call an age. Others may perhaps be of opinion, that this 30 years cycle of the druids is the same as the great year of the Pythagoreans, or a revolution of Saturn. Some have imagined that the druids were acquainted with the cycle of 10 years, which is commonly called the cycle of the moon. But the evidence of this depends entirely on the truth of that supposition, that the Hyperborean island, which is described by Diodorus Siculus, was Britain, or some of the British isles. Among many other surprising things, that author says, concerning this Hyperborean island "That its inhabitants believed that Apollo descended into their island at the entrance of every 12th year; and having understood their various revolutions, return to the same point, and begin to repeat the same revolutions. This is called by the Greeks the great year, or the cycle of Meton." We are told both by Caesar and Mela, that the druids studied the stars as well as the sun and moon; and that they professed to know, and taught their disciples, many things concerning the motions of these heavenly bodies. From these testimonies we may conclude that the druids were acquainted with the planets, distinguished them from the fixed stars, and carefully observed their motions and revolutions. If this discovery was the result of their own observations, it would be surprising; and it would be a long time before they found out all the planets. They might perhaps have received some assistance and information from Pythagoras, or from some other quarter. But whether this discovery of the planets was their own, or communicated to them by others, it is highly probable that they were acquainted with the precise number of these wandering stars. Dio Cassius says, that the custom of giving the name of one of the planets to each of the seven days of the week was an invention of the Egyptians, and from them was gradually communicated to all the other nations of the world; and that in this time this custom was so firmly established, not only among the Romans, but among all the rest of mankind, that in every country it appeared to be a native institution. The knowledge of the planets, and perhaps the custom of giving their names to the days of the week, was brought out of Egypt into Italy by Pythagoras, more than 500 years before the beginning of the Christian era; and from thence it could not be very long before it reached Gaul and Britain. But though we have little or no reason to doubt that the druids knew the number and observed the motion of the planets, yet it may be questioned whether they had discovered the times in which they performed their several revolutions. Some of these stars, as Jupiter and Saturn, take so great a number of years in revolving, that it required a very extraordinary degree of patience and attention to discover the precise periods of their revolutions. If we could be certain that the island in which the ancients imagined Saturn lay asleep, was one of the British isles, as Plutarch intimates it was, we might be inclined to think that the British druids were not ignorant of the length of the period in which the planet Saturn performs a revolution. For that same author, in another treatise, tells us, "That the inhabitants of that island kept every thirtieth year a solemn festival in honour of Saturn, when his star entered into the sign of Taurus." If we could depend upon the above testimony of Plutarch, we should have one positive proof that the druids of the British isles were acquainted with the constellations, and even with the signs of the zodiac; and that they measured the revolutions of the sun and planets, by observing the length of time between their departure from and return to one of these signs. But we have no direct evidence of this remaining in history. The druids of Gaul and Britain, as well as the ancient philosophers of other countries, had a general plan or system of the universe, and of the disposition and arrangement of its various parts, in which they inferred their decisions. This was both probable in itself, and is plainly intimated by several authors of the greatest authority. But we cannot be certain whether this drudical system of the world was of their own invention, or was borrowed from others. If it was borrowed, it was most probably from the Pythagoreans, to whom they were the nearest neighbours, and with whom they had the greatest intercourse.

It hath been imagined, that the druids had instruments of some kind or other, which answered the same purposes with our telescopes, in making observations on the heavenly bodies. The only foundation of this very improbable conjecture is an explication of Diodorus Siculus, in his description of the famous Hyperborean island. They say further, that the moon is seen from that island, as if she was but at some distance from the earth, and having hills or mountains like ours on her surface. But no such inference can be reasonably drawn from this expression, which in reality merits little more regard than what Strabo reports.
Druids were said of some of the inhabitants of Spain: "That they heard the hazing noise of the fun every evening when he fell into the western ocean."

The application of the druids to the study of philosophy and astronomy amounts almost to a demonstration that they applied also to the study of arithmetic and geometry. For some knowledge of both these sciences is indispensably necessary to the physiologist and astronomer, as well as of great and daily use in the common affairs of life.

Arithmetic.

If we were certain that Abaris, the famous Hyperborean philosopher, the friend and scholar of Pythagoras, was really a British druid, as some have imagined, we should be able to produce direct historical evidence of their arithmetic knowledge. For Lamblins, in the life of Pythagoras, says, "that he taught Abaris to find out all truth by the science of arithmetic." It may be thought improbable that the druids had made any considerable progress in arithmetic, as this may seem to be impossible by the mere strength of memory without the assistance of figures and written rules. But it is very difficult to ascertain what may be done by memory alone, when it hath been long exercised in this way. We have had an example in our own age, of a perfuit who could perform some of the most tedious and difficult operations in arithmetic by the mere strength of his memory.

The want of written rules could be no great disadvantage to the druids, as the precepts of this, as well as of the other sciences, were couched in verse, which would be easily got by heart and long remembered.

Though the druids were unacquainted with the Arabic characters which are now in use, we have no reason to suppose that they were destitute of marks or characters of some other kind, which, in some measure, answered the same purposes, both in making and recording their calculations. In particular, we have reason to think, that they made use of the letters of the Greek alphabet for both these purposes. This seems to be plainly intimated by Caesar in the following expression concerning the druids of Gaul: "In almost all other public transfections, and private accounts or computations, they make use of the Greek letters." This is further confirmed by what the same author says of the Helvetii; a people of the same origin, language, and manners, with the Gauls and Britons.

Tables were found in the camp of the Helvetii written in Greek letters, containing an account of all the men capable of bearing arms, who had left their native country, and also separate accounts of the boys, old men, and women. There is historical evidence of the druids being also well acquainted with geometry. "When any disputes arise (says Caesar) about their inheritances, or any controversies about the limits of their fields, they are entirely referred to the decision of their druids." But besides the knowledge of mensuration which this implies, both Caesar and Mela plainly intimate that the druids were conversant in the most sublime speculations of geometry; "in measuring the magnitude of the earth, and even of the world."

There are still many monuments remaining in Britain and the adjacent isles, which cannot so reasonably be ascribed to any as to the ancient Britons, and which give us cause to think, that they had made great progress in this useful part of learning, and could apply the mechanical powers so as to produce very astonishing effects. As these monuments appear to have been designed for religious purposes, we may be certain that they were erected under the direction of the druids. How many obelisks or pillars, of one rough unpolished stone each, are still to be seen in Britain and its isles? Some of these pillars are both very thick and lofty, erected on the summits of barrows and of mountains; and some of them (as at Stonehenge) have ponderous blocks of stone raised aloft, and resting on the tops of the upright pillars. We can hardly suppose that it was possible to cut these prodigious masses of stone (some of them above forty tons in weight) without wedges, or to raise them out of the quarry without levers. But it certainly required still greater knowledge of the mechanical powers, and of the method of applying them, to transport those huge stones from the quarry to the places of their destination; to erect the perpendicular pillars, and to elevate the imparts to the tops of these pillars. If this prodigious stone in the parith of Constantine, Cornwall, was really removed by art from its original place, and fixed where it now stands (as one of the most learned and diligent antiquaries thinks it was) it is a demonstration, that the druids could perform the most astonishing feats by their skill in mechanics. The Helvets, or rocking stones; and each of them consists of one prodigious block of stone, resting upon an upright stone or rock, and so equally balanced, that a very small force, sometimes even a child, can move it up and down, though hardly any force is sufficient to remove it from its station. Some of these stones may have fallen into this position by accident, but others of them evidently appear to have been placed in it by art. That the ancient Britons understood the constitution and use of wheels, the great number of their war-chariots and other wheel-carriages is a sufficient proof; and that they knew how to combine them together and with the other mechanical powers, so as to form machines capable of raising and transporting very heavy weights, we have good reason to believe.

In a word, if the British druids were wholly ignorant of the principles and use of any of the mechanical powers, it was most probably of the fire, though even of this we cannot be certain.

In Germany and in the northern nations of Europe the healing art was chiefly committed to the old women of every estate; but in Gaul and Britain it was intrusted to the druids, who were the physicians as well as the priests of these countries. Pliny says expressly, "That Tiberius Caeasar destroyed the druids of the Gauls, who were the poets and physicians of that nation;" and he might have added of the Britons. The people of Gaul and Britain were probably induced to devote the care of their health on the druids, and to apply to these priests for the cure of their diseases, not only by the high esteem they had of their wisdom and learning, but also by the opinion which they entertained.
tertain that a very intimate connection subsisted between the arts of healing and the rites of religion, and that the former were most effectual when they were accompanied by the latter. It appears indeed that the prevailing opinion of all the nations of antiquity, that all internal diseases proceeded immediately from the anger of the gods, and that the only way of obtaining relief from these diseases was by applying to their priests to appease their anger by religious rites and sacrifices. This was evidently the opinion and practice of the Gauls and Britons, who in some dangerous cases sacrificed one man as the most effectual means of curing another. "They are much addicted (says Caesar) to superstition; and for this cause, those who are afflicted with a dangerous disease sacrifice a man, or promise that they will sacrifice one, for their recovery. For this purpose they make use of the ministrity of the druids; because they have declared, that the anger of the immortal gods cannot be appeased, so as to spare the life of one man but by the life of another." This way of thinking gave rise also to that great number of magical rites and incantations with which the medical practices of the druids, and indeed of all the physicians of antiquity, were attended. "No body doubts (says Pliny) that magic derived its origin from medicine, and that by its flattering but delusive promises, it came to be esteemed the most sublime and sacred part of the art of healing."

That the druids made great use of herbs for medicinal purposes, we have sufficient evidence. They not only had a most superstitious veneration for the milletoe of the oak, on a religious account, but they also entertained a very high opinion of its medical virtues, and esteemed it a kind of panacea or remedy for all diseases. "They call it (says Pliny) by a name which in their language signifies Althea, because they have an opinion that it cures all diseases." They believed it to be in particular a specific against barrenness, and a sovereign antidote against the fatal effects of poisons of all kinds. It was esteemed also an excellent emollient and diffusent for softening and discharging hard tumors; good for drying up scrophulous sores; for curing ulcers and wounds; and (provided it was not suffered to touch the earth after it was cut) it was thought to be a very efficacious medicine in the epilepsy or falling-fits. It hath been thought useful in this last calamitous disease by some modern physicians. The pompous ceremonies with which the milletoe was gathered by the druids have been already described. The felago, a kind of hedge hyssop resembling favius, was another plant much admired by the druids of Gaul and Britain for its supposed medicinal virtues, particularly in all diseases of the eyes. But its efficacy, according to them, depended very much upon its being gathered exactly in the following manner: The person who gathered it was to be clothed in a white robe, to have his feet bare, and washed in pure water; to offer a sacrifice of bread and wine before he proceeded to cut it; which he was to do with his right hand covered with the skirt of his garment, and with a hook of some more precious metal than iron. When it was cut, it was to be received into, and kept in a new and very clean cloth. When it was gathered exactly according to this whimsical rite, they affirmed that it was not only an excellent medicine, but also a powerful charm and preservative from misfortunes and unhappy accidents of all kinds. They entertained a high opinion also of the herb Samolus or marhwort, for its laudative qualities; and gave many directions for the gathering it, no less faultless than those above mentioned. The person who was to perform that office was to do it sitting, and with his left hand; he was to account to look behind him, nor to turn his face from the herbs he was gathering. It would be tedious to relate the extravagant notions they entertained of the many virtues of the vervain, and to recount the ridiculous mummeries which they practised in gathering and preparing it, both for the purposes of divination and physic. These things may be seen in Plin. Hist. Nat. 1. 25. c. 9. from whence we have received all these anecdotes of the botany of the druids. It is easy to see that his information was very imperfect; and that, like many other Greek and Roman writers, he designly represents the philosophers of Gaul and Britain in an unfavourable light. The herb which was called Britannica by the ancients, which some think was the great water-dock, and others the hemp or vervain, was probably much used in this island for medical purposes; as it derived its name from hence, and was from hence exported to Rome and other parts. I have thought these few imperfect hints are all that we can now collect of the botany of the British druids, yet we have some reason to think that they were not contemptible botanists. Their circumstances were peculiarly favourable for the acquisition of this kind of knowledge. For as they spent most of their time in the receivings of mountains, groves, and woods, the spontaneous vegetable productions of the earth constantly presented themselves to their view, and coursed their attention.

The opinions which, it is said, the druids of Gaul and Britain entertained of their anguinum or serpents egg, both as a charm and as a medicine, are romantic and extravagant in a very high degree. This extraordinary egg was formed, as they pretended, by a great number of serpents interwoven and twined together; and when it was formed, it was raised up in the air by the hooting of these serpents, and was to be caught in a clean white cloth, before it fell to the ground. The person who caught it was obliged to mount a swift horse, and to ride away at full speed to escape from the serpents, who pursued him with great rage, until they were stopped by some river. The way of making trial of the genuineness of the egg was no less extraordinary. It was to be enclosed in gold, and thrown into a river, and if it was genuine it would swim against the stream. "I have seen (says Pliny) that egg; it is about the bigness of a moderate apple, its shell is a cartilaginous incrustation, full of little cavities, such as are on the legs of the polypus; it is the insignia, or badge of distinction of the druids." The virtues which they ascribed to this egg were many and wonderful. It was particularly efficacious to render those who carried it about with them superior to their adversaries in all disputes, and to procure them the favour and friendship of great men. Some have thought that this whole affair of the serpents egg was a mere fraud, contrived by the druids, to excite the admiration and pick the pockets of credulous people, who purchased these wonder-working eggs from them
at a high price. Others have imagined that this story of the anguinum (of which there is an ancient monument in the cathedral at Paris) was an emblematical representation of the doctrine of the druids concerning the creation of the world. The serpents, say they, represent the Divine Wisdom abounding in the universe, and the egg is the emblem of the world formed by that Wisdom. It may be added, that the virtue ascribed to the anguinum, of giving those who possessed it a superiority over others, and endearing them to great men, may perhaps be intended to represent the natural effects of learning and philosophy. But in so doubtful a matter everyone is at liberty to form what judgment he thinks proper.

As the influence and authority of the druids in their own country depended very much upon the reputation of their superior wisdom and learning, they wisely applied to the study of those sciences which most directly contributed to the support and advancement of that reputation. In this respect, besides those already mentioned, we may justly reckon rhetoric, which was diligently studied and taught by the druids of Gaul and Britain; who to the charms of eloquence and authority which they enjoyed. They had indeed many calls and opportunities to display their eloquence, and to discover their great power and efficacy; as, when they were teaching their pupils in their schools, when they discoursed in public to the people on religious and moral subjects, when they pleaded causes in the courts of justice, and when they harangued in the great councils of the nation, and at the heads of armies ready to engage in battle; sometimes with a view to inflame their courage, and at other times with a design to allay their fury, and diffuse them to make peace. Though this last was certainly a very difficult task among fierce and warlike nations, yet such was the authority and eloquence of the druids that they frequently succeeded in it. "They pay a great regard (says Diodorus Siculus) to their exhortations, not only in the affairs of peace, but even of war, and there are respected both by their friends and enemies. They sometimes step in between two hostile armies, who are standing with their swords drawn and their spears extended ready to engage; and by their eloquence, as by an irresistible enchantment, they prevent the effusion of blood, and prevail upon them to sheath their swords. So great are the charms of eloquence and the power of wisdom, even among the most fierce barbarians." The British kings and chieftains, who were educated by the druids, were famous for their eloquence. This is evident from the many noble speeches which are ascribed to them by the Greek and Roman writers. For though those speeches may not be genuine, yet they are a proof that it was a well known fact that those princes were accustomed to make harangues on those and the like occasions. This we are expressly told by Tacitus: "The British chieftains, before a battle, fly from rank to rank, and address their men with animating speeches, tending to inflame their courage, increase their hopes, and dispel their fears." These harangues were called, in the ancient language of Britain, Brofnichey Koh, which is literally translated by Tacitus Incentamenta Belli, "Incentives to war." The genuine power of the ancient Britons long retained their taste for eloquence, and their high esteem for those who excelled in that art. "Orators (says Mr Martin) were in high esteem both in these isles (the Æbube) and the continent, until within these forty years. They sat always among the nobles or chiefs of families in the temple or circle. Their houses and little villages were sanctuaries, as well as churches, and they took place before doctors of physic. The orators, after the druids were extirpated, were brought in to preserve the genealogy of families, and to repeat the fame at every succession of a chief; and upon the occasion of marriages and births, they made epithalamiums and panegyrics, which the poet or bard pronounced. The orators, by the force of their eloquence, had a powerful ascendant over the greatest men in their time. For if any orator did but inflame the habit, arms, horse, or any other thing belonging to the greatest man in these isles, it was readily granted him; sometimes out of respect, and sometimes for fear of being exclaimed against by a Fury, which in those days was reckoned a great dishonour."

If the British druids, considering the times in which they lived, had made no contemptible proficiency in several parts of real and useful learning; it cannot be denied that they were also great pretenders to superior knowledge in certain vain fallacious sciences, by which they excited the admiration, and took advantage of the ignorance and credulity of mankind. These were the sciences (if they may be so called) of magic and divination; by which they pretended to work a kind of miracles, and exhibit astonishing appearances in nature: to penetrate into the counsels of heaven; to foretell future events, and to discover the successes or miscarriage of public or private undertakings. Their own countrymen not only believed that the druids of Gaul and Britain were possessed of these powers, but they were celebrated on this account by the philosophers of Greece and Rome. "In Britain (says Pliny) the magic arts are cultivated with such astonishing success, and so many ceremonies at this day, that the Britons seem to be capable of instructing even the Persians themselves in these arts. They pretend to discover the designs and purposes of the gods. The Eubates or Vates in particular investigate and display the most sublime secrets of nature; and, by anacles and sacrifices, they foretell future events." They were so famous for the supposed veracity of their predictions, that they were not only consulted on all important occasions by their own princes and great men, but even sometimes by the Roman emperors. Nor is it very difficult to account for all this. The druids finding that the reputation of their magical and prophetical powers contributed not a little to the advancement of their wealth and influence, they endeavoured, no doubt, to strengthen and establish it by all their art and cunning. Their knowledge of natural philosophy and mechanics enabled them to execute such works, and to exhibit such appearances; or to make the world believe that they did exhibit them, as were sufficient to gain them the character of great magicians. The truth is, that nothing is more easy than to acquire this character in a dark age, and among an unenlightened people. When the minds of men are haunted with dreams of charms and enchantments, they are apt to fancy that the most common occurrences
Druids. "currences in nature are the effects of magical arts. The following strange story, which we meet with in Plutarch's Treatise of the Cestion of Oracles, was probably occasioned by something of this kind. "There are many islands which lie scattered about the isle of Britain, after the manner of our justice emperor (perhaps Claudius) to discover those parts. He arrived at one of these islands (supposed by some to be Anglesey, but more probably one of Albadea) next adjoining to the isle of Britain before mentioned, which was inhabited by a few Britons, who were esteemed sacred and inviolable by their countrymen. Immediately after his arrival the air grew black and troubled, and strange apparitions were seen; the winds rose to a tempest, and fiery spouts and whirlwinds appeared dancing towards the earth." This was probably no more than a form of wind, accompanied with rain and lightning; a thing neither unnatural nor uncommon: but Demetrius and his companions having heard that the Britifh druids, by whom this isle was chiefly inhabited, were great magicians, they imagined that it was raised by them; and fancied that they saw many strange unnatural sights. The druids did not think proper to unseal them; for when they enquired at them about the cause of this form, they told them it was occasioned by the death of one of those invisible beings or genii who frequented their isle. A wonderful and artful tale, very well calculated to encrease the superstitious fears of Demetrius and his crew; and to determine them to abandon this enchanted isle, with a resolution never to return. Stonehenge, and several other works of the druids, were believed to have been executed by the arts of magic and enchantment, for many ages after the destruction of their whole order; nor is it improbable that they persuaded the vulgar in their own times to entertain the same opinion of these works, by concealing from them the real arts by which they were performed. The natural and acquired sagacity of the druids, their long experience, and great concern in the conduct of affairs, enabled them to form very probable conjectures about the events of enterprises. These conjectures they pronounced as oracles, when they were confuted; and they pretended to derive them from the inspection of the entrails of victims, the observation of the flight and feeding of certain birds, and many other mummeries. By these, and the like arts, they obtained and preserved the reputation of prophetic foreknowledge among an ignorant and credulous people. But these pretensions of the druids to magic and divination, which contributed so much to the advancement of their fame and fortune in their own times, have brought very heavy reproaches upon their memory, and have made some learned moderns declare that they ought to be expunged out of the catalogue of philosophers, and esteemed no better than mere cheats and jugglers. This censure is evidently too severe, and might have been pronounced with equal justice upon all the ancient philosophers of Egypt, Africa, Asia, Greece, and Rome; who were great pretenders to magic and divination, as well as the druids. "I know of no nation in the world (says Cicero) either so polite and learned, or so savage and barbarous, as not to believe that future events are prefigurated to us, and may by some men be discovered and foretold." The only conclusion therefore that can be fairly drawn, from the successful pretensions of the British druids to the arts of magic and divination, is this—that they had more knowledge than their countrymen and contemporaries; but had not so much virtue to resist the temptation of imposing upon their ignorance, to their own advantage.

Drum, or Drummer, he that beats the drum; of whom each company of foot has one, and sometimes two. Every regiment has a drum-major, who has the command over the other drums. They are distinguished from the soldiers by cloaths of a different fashion: their post, when a battalion is drawn up, is on the flanks, and on a march it is betwixt the divisions.

Drum of the Ear, the same with the tympanum. See Anatomy, p. 141.

Drummond (William), a polite writer, born in Scotland in 1583; was the son of Sir John Drummond, who for ten or twelve years was usher and afterwards knight of the black rod to James VI. His family became first distinguished by the marriage of Robert III. whose queen was sister to William Drummond of Carnock their ancestor; as appears by the patents of that king and James I. the one calling him "our brother," the other "our uncle."

Drummond was educated at Edinburgh, where he took the degree of A. M. In 1606 he was sent by his father to study civil law at Bourges in France; but having no taste for the profession of a lawyer, he returned to Scotland, and retired to his agreeable seat at Hawthornden; where he applied himself with great industry and about the same time, his Flowers of Sion, in verse. But an accident befell him, which obliged him to quit his retirement, and that was the death of an amiable lady to whom he was just going to be married. This affected him so deeply, that he went to Paris and Rome, between which two places he resided eight years. He travelled also thro' Germany, France, and Italy, where he visits universities; conversed with learned men; and made a choice collection of the ancient Greek, and of the modern Spanish, French, and Italian books. He then returned to his native country; and at one time thereafter married.
Drummond

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Among all the writers, at the beginning of the 18th century, who flourished after the death of Shakespeare, an ingenious critic observes, there is not one whom a general reader of the English poetry of that age will regard with so much and so deserved attention as William Drummond. In a survey of his poetry, two considerations must be had, viz., the nation of which he was, and the time when he wrote. Yet will these not be found to extenuate faults, but to increase admiration. His thoughts are often, nay generally, bold and highly poetical; he follows nature, and his verses are naturally harmonious. As his poems are not easily met with, and have perhaps by many readers never been heard of, a few extracts may be excused.

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Drunkenness is repeatedly forbidden by St Paul: "Be not drunk with wine, wherein is excess." "Let us walk honestly as in the day, not in rioting and drunkenness." "Be not deceived: neither fornicators, nor drunkards, nor idolaters, shall inherit the kingdom of God." Eph. v. 18. Rom. xiii. 1. Cor. vi. 9, 10. The same apostle likewise condemns drunkenness, as peculiarly inconsistent with the Christian profession: "They that be drunken, are drunken in the night; but let us, who are of the day, be sober." 1 Thess. v. 7, 8.

Drunkenness, by the English laws, is looked upon as an aggravation rather than an excuse for any criminal behaviour. A drunkard, says Sir Edward Coke, who is voluntarius damen, hath no privilege thereby; but what hurt or ill fovere he doth, his drunkenness doth aggravate it: nam omne crimen obietas, et incendit, et distergit. It hath been observed that the real use of strong liquors, and the abuse of them by drinking to excess, depend much upon the temperance of the climate in which we live. The same president Monsiguet, drinks through custom founded upon constitutional necessity; a Spaniard drinks through choice, or out of the mere wantonness of luxury; and drunkenness, he adds, ought to be more severely punished where it makes men mischievous and mad, as in Spain and Italy, than where it only renders them stupid and heavy, as in Germany and more northern countries. And accordingly, in the warmer climate of Greece, a law of Pittacus enacted, "that he who committed a crime when drunk, should receive a double punishment," one for the crime in itself, and another for the ebriety which prompted him to commit it. The Roman law indeed made great allowances for this vice: per vi num delapsi, capitalis penaruminitur. But the law of England considering how easy it is to counterfeit this excuse, and how weak an excuse it is (though real) will not suffer any man thus to privilege one crime by another.

For the offence of drunkenness a man may be punished in the ecclesiastical court, as well as by juries of peace by statute. And by 4 Jac. 1. c. 5. and 21 Jac. 1. c. 7. if any person shall be convicted of

Drunkenness

Drunk-POunders. Although the waste of time and money may be
of small importance to you, it may be of the utmost to some one or other whom your society corrupts. Repeated, or long continued excesses, which hurt not your health, may be fatal to your companion. Although you have neither wife nor child, nor parent, to lament your absence from home, or expect your return to it with terror; other families, whole husbands and fathers have been invited to share in your ebriety, or encouraged to imitate it, may justly lay their misery or ruin at your door. This will hold good, whether the person reduced be reduced immediately by you, or the vice be propagated from you to him, through several intermediate examples."
Drunkenness by the view of a justice, oath of one witness, &c. he shall forfeit 5s. for the first offence, to be levied by divers and sale of his goods; and for want of a divers, shall sit in the stocks six hours: and, for the second offence, he is to be bound with two sureties in 10l. each, to be of good behaviour, or to be committed. And he who is guilty of any crime thro' his own voluntary drunkenness, shall be punished for it as if he had been sober. It has been held that drunkenness is a sufficient cause to remove a magistrate, and the prosecution for this offence by the statute of 4 Jac. I. c. 5. was to be, and still may be, before justices of peace in their seelions by way of indictment, &c. Equity will not relieve against a bond, &c. given by a man when drunk, unless the drunkenness is occasioned through the management or contrivance of him to whom the bond is given.

The appetite for intoxicating liquors appears to be almost always acquired. One proof of which is, that it is apt to return only at particular times and places; as after dinner, in the evening, on the market day, at the market town, in such a company, at such a tavern. And this may be the reason, that if a habit of drunkenness be ever overcome, it is upon some change of place, situation, company, or profession. A man sunk deep in a habit of drunkenness, will upon such occasions as these, when he finds himself loosened from the associations which held him fast, sometimes make a plunge, and get out. In a matter of such great importance, it is well worth while, where it is tolerably convenient, to change our habit and society, for the sake of the experiment.

Habits of drunkenness commonly take their rise either from a fondness for and connection with some company, or some companion, already addicted to this practice; which affords an almost irresistible invitation to take a share in the indulgences which those about us are enjoying with so much apparent relish and delight; or from want of regular employment, which is sure to let in many superfluous cravings and customs, and often this amongst the rest; or, lastly, from grief or fatigue, both which strongly solicit that relief which inebriating liquors afford the present, and furnish a specious excuse for complying with the inclination. But the habit, when once set in, is continued by different motives from those to which it owes its origin. Persons addicted to excessive drinking, suffer, in the intervals of sobriety, and near the return of their accustomd indulgence, a faintness and oppression about the proceraus which it exceeds the ordinary patience of human nature to endure. This is usually relieved for a short time time by a repetition of the same excess: and to this relief, as to the removal of every long continued pain, they who have once experienced it are urged almost beyond the power of resistance. This is not all: as the liquor loses its stimulus, the dose must be increased, to reach the same pitch of elevation or ease; which increase proportionally accelerates the progress of all the maladies that drunkenness brings on. Whoever reflects, therefore, upon the violence of the craving in advanced stages of the habit, and the fatal termination to which the gratification of it leads, will, the moment he perceives the least tendency in himself of a growing inclination to intemperance, collect his resolution to this point; or (what perhaps he will find his best security) arm himself with some peremptory rule, as to the times and quantity of his indulgencies.

DRUPA, or DRUPPA, in botany, a species of pe­ricarpium or feed-vessel, which is succulent or pulpy, has no valve or external opening like the capule and pod, and contains within its substance a stone or nut. The cherry, plum, peach, apricot, and all other stone-fruit are of this kind.

The term, which is of great antiquity, is synonymous to Tournefort's fructus multis office, "fruit with a stone;" and to the prunus of other botanists.

The stone or nut, in which this species of fruit is surrounded by the soft pulpy flesh, is a kind of ligneous or woody cup, which contains a single kernel or seed.

This definition, however, will not apply to every seed-vessel denominated drupa in the Genera Plantarum. The almond is a drupa, fo is the seed-vessel of the elm-tree and the genus rumphia, though far from being pulpy or succulent; the first and third are of a substance like leather, the second like parchment. The fane may be paid of the walnut, pittachia-nut, guettarda, quijquis, jack-in-a-box, and some others.

Again, the seeds of the elm, ferebroba, flagellaria, and the mango-tree, are not contained in a stone. The seed-vessel of barre-reed is dry, shaped like a top, and contains two angular stones.

This species of fruit, or more properly seed-vessel, is commonly roundish, and when feated below the calyx or receptacle of the flower, is furnished, like the apple, at the end opposite to the foot-stalk, with a small umbilicus or cavity, which is produced by the swelling of the fruit before the falling off of the flower-cup.

DRUSES, or Druzee, a remarkable nation in Palestine, inhabiting the environs of Mount Lebanon, of whole origin and history we have the following detail by M. Volney.

Twenty-three years after the death of Mahomet, the disputes between Ali his fon-in-law and Meomia governor of Syria, occasioned the first schism in the empire of the Arabs, and the two sects subsisted to this day; but, in reality, this difference related only to power; and the Mahometans, however divided in opinion respecting the rightful successor of the prophet, were agreed with respect to their dogmas. It was not until the following century that the perus of Greek books introduced among the Arabs a spirit of discussion and controversy, to which till then they were not strangers. The consequence was, as might be expected, by reasoning on matters not susceptible of demonstration, and guided by the abstract principles of an unintelligible logic, they divided into a multitude of sects and opinions. At this period, too, the civil power lost its authority; and religion, which from that derives the means of preserving its unity, shared the same fate, and the Mahometans now experienced what had before befallen the Christians. The nations which had received the religion of Mahomet, mixed with it their former absurd notions; and the errors which had anciently prevailed over Asia again made their appearance, though altered in their forms. The metem­psychos, the doctrine of a good and evil principle, and the recreation after fix thousand years, as it had been taught by Zoroaster, were again revived among the Mahometans.
DRU

Mahometans. In this political and religious confusion, every enthusiast became an apostle, and every apostle the head of a sect. No less than sixty of these were reckoned, remarkable for the number of their followers, all differing in some points of faith, and all disavowing hereby and error. Such was the state of these states when at the commencement of the 1st century Egypt became the theatre of one of the most extravagant scenes of enthusiasm and absurdity ever recorded in history. The following account is extracted from the eastern writers.

In the year of the Hijira 386 (A.D. 996), the third caliph of the race of the Fatemites, called Hakem-b’ amr-ellah, succeeded to the throne of Egypt at the age of 14 years. He was one of the most extraordinary princes of whom history has preserved the memory. He caused the first caliphs, the companions of Mahomet, to be cursed in the mosques, and afterwards revoked the anathema: He compelled the Jews and Christians to abjure their religion, and then permitted them to resume it. He prohibited the making slippers for women, to prevent them from coming out of their houses. He burnt the head of a poet. Hakem-b’ amr-ellah, succeeded to the throne of Egypt at the age of 14 years. He was one of the most extraordinary princes of whom history has preserved the memory. He caused the first caliphs, the companions of Mahomet, to be cursed in the mosques, and afterwards revoked the anathema: He compelled the Jews and Christians to abjure their religion, and then permitted them to resume it. He prohibited the making slippers for women, to prevent them from coming out of their houses. He burnt the head of a poet.

It appears that this expedition was the epoch of a considerable change in the constitution of the Druzes. Till then they had lived in a sort of anarchy, under the command of different sheikhs or lords. The nation was likewise divided into two factions, such as is to be found in all the Arab tribes, and which are distinguished into the party Kaifi and the party Yamani. To simplify the administration, Ibrahim, permitted them only one chief who should be responsible for the tribute, and execute the office of civil magistrate; and the governor, from the nature of his situation, acquiring great authority, became almost the king of the republic; but as he was always chosen from among the Druzes, a confluence followed which the Turks had not foreseen, and which was nearly fatal to their power. For the chief thus chosen, having at his disposal the whole strength of the nation, was able to use it unambiguously for his own purposes; and which are distinguished into the party Kaifi and the party Yamani. To simplify the administration, Ibrahim, permitted them only one chief who should be responsible for the tribute, and execute the office of civil magistrate; and the governor, from the nature of his situation, acquiring great authority, became almost the king of the republic; but as he was always chosen from among the Druzes, a confluence followed which the Turks had not foreseen, and which was nearly fatal to their power. For the chief thus chosen, having at his disposal the whole strength of the nation, was able to use it unambiguously for his own purposes.

The death of these two chiefs did not stop the progress of their opinions: a disciple of Mohammeid-ben-Ismail, named Hansa-ben-Ahmad, propagated them with an indefatigable zeal in Egypt, in Palestine, and along the coast of Syria, as far as Sidon and Berghius. His proselytes being persecuted by the state in power, they took refuge in the mountains of Lebanon, where they were better able to defend themselves; at least it is certain, that shortly after this era, we find them established there, and forming an independent society.

The difference of their opinions disposed them to be enemies; but the urgent interest of their common safety forces them to allow mutual toleration, and they have always appeared united, and have jointly opposed, at different times, the Crusaders, the sultans of Aleppo, the Mamlouks, and the Ottomans. The conquest of Syria by the latter, made no change in their situation. Selim I. on his return from Egypt, meditating
availed himself of the misconduct of the Aga, expelled him, levied on the city, and even had the art to make a merit of this act of hostility with the Divan, by paying a more considerable tribute. He proceeded in the same manner at Saïde, Balbek and Sourah, and at length, about the year 1623, gave himself master of all the country as far as Adjaloun and Safad. The pachas of Tripoli and Damascus could not see these encroachments with indifference; sometimes, however, and sometimes endeavored to ruin him at the Porte by secret accusations; but the Emir, who maintained there his spies and defenders, defeated every attempt.

At length, however, the Divan began to be alarmed at the progress of the Druzes, and made preparations for an expedition capable of crushing them. Whether from policy or fear, Fakher-el-din did not think proper to wait this storm. He had formed connections in Italy, on which he built great hopes, and promised him; persuaded that his presence would create the zeal of his friends, while his absence might appease the resentment of his enemies. He therefore intrusted to his son Ali, repaired to the court of the Medici at Florence. The arrival of an Oriental prince in Italy did not fail to attract the public attention. Enquiry was made into his nation, and the prince in Italy did not fail to attract the Medici at Florence. The arrival of an Oriental prince in Italy did not fail to attract the public attention. Enquiry was made into his nation, and the prince in Italy did not fail to attract the public attention. Enquiry was made into his nation, and the prince in Italy did not fail to attract the public attention.

The Consequences of this conduct soon manifested themselves: the Druzes, who paid the same tribute as in time of war, became dissatisfied. The Yamani faction were routed; the people murmured at the exactions of the prince; and the luxury he displayed renewed the jealousy of the pachas. They attempted to levy greater tribute: hostilities again commenced, and Fakher-el-din repulsed the forces of the pachas; who took occasion from this resistance, to render him suspected by the sultan himself. Amurath III. incensed that one of his subjects should dare to enter into a competition with him, resolved on his destruction; and the pacha of Damascus received orders to march, with all his forces, against Bairout, the usual residence of Fakher-el-din; while 40 galleys invested it by sea, and cut off all communication.

The Emir, who depended on his good fortune and succours from Italy, determined at first to brave the storm. His son Ali, who commanded at Safad, was ordered to oppose the progress of the Turk in the mountains, and in fact he bravely resisted them, notwithstanding the great disparity of his forces: but after two engagements, in which he had the advantage, being slain in a third attack, the face of affairs were greatly changed, and every thing went to ruin. Fakher-el-din, terrified at the loss of his troops, afflicted at the death of his son, and enfeebled by age and a voluptuous life, lost both courage and presence of mind. He no longer saw any resource but in a peace, which he sent his second son to solicit of the Turkish admiral, whom he attempted to seduce by presents; but the admiral, detaining both the presents and envoy, declared he would have the prince himself. Fakher-el-din, intimidated, took to flight, and was pursued by the Turks, now masters of the country. He took refuge on the steep eminence of Nîha, where they besieged him ineffectually for a whole year, when they left him at liberty: but shortly after, the companions of his adversity, weared with their sufferings, betrayed and delivered
delivered him up to the Turks. Faker-el-din, though in the hands of his enemies, conceived hopes of pardon, and suffered himself to be carried to Constantinople, where Amurath, pleased to behold at his feet a prince so celebrated, at first treated him with that benevolence which arises from the pride of superiority; but soon returning to his former jealousies, yielded to the instigations of his courtiers, and, in one of his violent fits of passion, ordered him to be strangled, about the year 1631.

After the death of Faker-el-din, the potterty of that prince still continued in possession of the government, though at the pleasure, and as valets, of the Turks. This family falling in the male line at the beginning of the present century, the authority devolved, by the election of the shaiks, on the house of Shelah, in which it still continues. The only emir of that house, whose name deserves to be preserved, is the emir Melhem, who reigned from 1740 to 1759; in which interval he recovered the losses of the Druzes, and restored them to that confederation which they had lost by the defeat of Faker-el-din. Towards the end of his life, about the year 1754, Melhem, wearied with the cares of government, abdicated his authority, to live in religious retirement, after the manner of Sad-el-Kouri; but the troubles that succeeded occasioned him once more to resume the reins of government, which he held till 1759, when he died, universally regretted.

He left three sons, minors: the eldest of whom ought, according to the custom of the country, to have succeeded him; but being only 11 years of age, the authority devolved on his uncle Manfour, agreeable to a law very general in Asia, which wills the people to be governed by a sovereign who has arrived at years of maturitv. The young prince was but little fitted to maintain his pretensions; but a Maronite, named Sad-el-Kouri, to whom Melhem had entrusted his education, took this upon himself. Afliring to see his pupil a powerful prince, that he might himself become a powerful vijir, he made every exertion to advance his fortune. He first retired with him to Djebail, in the Kesraouan, where the emir Yousefi, polished large domains, and there undertook to conciliate the Maronites, by embracing every opportunity to serve both individuals and the nation. The greater part of his pupil, and the moderation of his expenditure, amply furnished him with the means. The farm of the Kesraouan was divided between several shaiks, with whom the Porte was not very well satisfied. Sad treated for the whole with the pacha of Tripoli, and got himself appointed sole receiver. The Motoualis of the valley of Balbek had for some years before made several encroachments on Lebanon, and the Maronites began to be alarmed at the near approach of these intolerant Mahometans. Sad purchased of the pacha of Damascus a permission to make war upon them; in 1763 drove them out of the country. The Druzes were at that time divided into two factions: Sad united his interest with the shaiks who opposed Manfour, and secretly prepared the plot which was to raise the nephew on the ruin of the uncle.

At this period the Arab Daher, who had made himself master of Galilee, and fixed his residence at Acre, disquieted the Porte by his progress and pretentions; to oppose him, the Divan had just united the pachalics of Damascus, Saide, and Tripoli, in the hands of Osman and his children; and it was evident, that an open war was not very remote. Manfour, who dreaded the Turks too much to resist them, made use of the policy usual on such occasions, pretending a zeal for their service, while he secretly favoured their enemy. This was a sufficient motive for Sad to pursue measures directly opposite. He supported the Turks against the faction of Manfour, and manoeuvred with so much good fortune as to depose that emir in 1770, and place Yousefi in his government.

In the following year All Bey declared war and attacked Damascus. Yousefi, called on by the Turks, took part in the quarrel, but without being able to draw the Druzes from their mountains to enter into the army of the Ottomans. Besides their natural repugnance, at all times, to make war out of their country, they were on this occasion too much divided at home to quit their habitations, and they had reason to congratulate themselves on the event. The battle of Damascus ensued; and the Turks, as we have already seen, were completely routed. The pacha of Saide escaping from this defeat, and not thinking himself in safety in that town, sought an asylum even in the house of the emir Yousefi. The moment was unfavourable; but the face of affairs soon changed by the flight of Mohammed Bey. The emir, concluding that All Bey was dead, and not imagining that Daher was powerful enough to hold his ground, declared openly against him. Saide was threatened with a siege, and he detached 1700 men of his faction to its defence; while himself in person, prevailing on the Druzes and Maronites to follow him, made an incursion with 25,000 peasants into the valley of Bekaa; and in the absence of the Motoualis, who had joined the army of Daher, laid the whole country waste with fire and sword from Balbek to Tyré.

While the Druzes, proud of this exploit, were marching in disorder towards the latter city, 500 Motoualis, informed of what had happened, flew from Acre inflamed with rage and despair, and fell with such impetuosity on their army as to give them a complete overthrow. Such was the surprise and confusion of the Druzes, that, imagining themselves attacked by Daher himself and betrayed by their companions, they turned their swords on each other as they fled. The steep declivities of Djezin, and the pine-woods which were in the route of the fugitives, were firened with dead, but few of whom perished by the hands of the Motoualis.

The emir Yousefi, ashamed of this defeat, escaped to Dair-el-Kamar, and shortly after attempted to take revenge; but being again defeated in the plain between Saide and Sour (Tyre), he was constrained to resign to his uncle Manfour the ring, which among the Druzes is the symbol of command. In 1773 he was restored by a new revolution; but he could not support his power but at the expense of a civil war. In order, therefore, to prevent Bahrout falling into the hands of the adverse faction, he requested the affittance of the Turks, and demanded of the pacha of Damascus a man of sufficient abilities to defend that city. The choice
Ragufan captains, fortune, to those of every other nation, he sold himself to the slave-dealers to be conveyed to Egypt; and, on his arrival at Cairo, was purchased by Ali Bey, who placed him among his Mamlouks.

Ahmad was not long in distinguishing himself by his courage and address. His patron employed him on several occasions in dangerous coups de main, such as the affaillation of such boys and cachets as he suspected: of which commissions he acquired himself so well as to acquire the name of Djezzar, which signifies Cut-throat. With this claim to his friendship, he enjoyed the favour of Ali until it was disturbed by an accident.

This jealous Bey having proscribed one of his benefactors called Saleh Bey, commanded Djezzar to cut off his head. Either from humanity or some secret friendship for the devoted victim, Djezzar hesitated, and even remonstrated against the order. But learning the next day that Mohammed Bey had executed the commissary, and that Ali had spoken of him not very favourably, he thought himself a lost man, and, to avoid the fate of Saleh Bey, escaped unobserved, and reached Constantiopolis. He there solicited employments suitable to his former rank; but meeting, as is usual in capitals, with a great number of rivals, he pursued another plan, and went to seek his fortune in Syria as a private soldier. Chance conducted him among the Druzes, where he was hospitably entertained, even in the house of the kiaa of the emir Youlef. From thence he repaired to Damacus, where he soon obtained the title of Aga, with command of five pair of colours, that is to say, of 50 men; and he was thus situated when fortune defined him to the government of Beirut.

Djezzar was no sooner established there than he took possession of it for the Turks. Youlef was confounded at this proceeding. He demanded justice at Damacus; but finding his complaints treated with contempt, entered into a treaty with Daher, and concluded an offensive and defensive alliance with him at Ras-el-aen, near to Sour. No sooner was Daher united with the Druzes than he laid siege to Beirut by land, whilst two Russian frigates, whose service was purchased by 600 purses, cannonaded it by sea. Djezzar was compelled to submit to force, and, after a vigorous resistance, gave up the city and surrendered himself prisoner. Shaik Daher charmed with his courage, and flattered with the preference he had given him in the surrender, conducted him to Acre, and showed him every mark of kindness. He even ventured to trust him with a small expedition into Palesrine, but Djezzar, on approaching Jerusalem, went over to the Turks and returned to Damacus.

The war of Mohammed Bey breaking out, Djezzar offered his service to the captain Pacha, and gained his confidence. He accompanied him to the siege of Acre; and that admiral having destroyed Daher, and finding no person more proper than Djezzar to accomplish the designs of the Porte in that country, named him pacha of Salde.

Being now, in consequence of this revolution, superior lord to the emir Youlef, Djezzar is mindful of injuries in proportion as he has reason to accuse himself of ingratitude. By a conduct truly Turkish, feigning alternately gratitude and resentment, he is alternately on terms of dispute and reconciliation with him, continually exacting money as the price of peace, or as indemnity for war. His artifices have succeeded so well, that within the space of five years he has extorted from the emir four millions of French money (above L. 160,000), a sum the more astonishing, as the farm of the country of the Druzes did not them amount to 100,000 livres (L.4000).

In 1784 he made war on him, depofed him, and belowed the government on the emir of the country of Hafouya, named Imsael. Youlef, having once more purchased his favour, returned towards the end of the same year to Dair-e1-Kamar, and even courted his confidence so far as to wait on him at Acre, from whence nobody expected him to return; but Djezzar is too cunning to shed blood while there are any hopes of getting money: he released the prince, and sent him back with every mark of friendship. Since that period the Porte has named him pacha of Damacus, while he also retained the sovereignty of the pachalic of Acre, and of the Druzes.

As to the religion of the Druzes: What has been already said of the opinions of Mohammed-ben-Imsael may be regarded as the substance of it. They pracie neither circumcision, nor prayers, nor fasting; they observe neither festivals nor prohibitions. They drink wine, eat pork, and allow marriage between brothers and sisters, though not between fathers and children. From this we may conclude, with reason, that the Druzes have no religion; yet one class of them must be excepted, whose religious customs are very peculiar. Those who compose it are to the rest of the nation what the initiated were to the profane; they assume the name of Otkals, which means spiritualists, and flow on the vulgar the epithet of Dijabil or ignorant; they have various degrees of initiation, the higher orders of which require celibacy. These are distinguishable by the white turban they affect to wear, as a symbol of their purity; and so proud are they of this supposed purity, that they think themselves full of by even touching a profane person. If you eat out of their plate, or drink out of their cup, they break them; and hence the custom, so general in this country, of using vases with a fort of cock, which may be drank out of without touching them with the lips. All their practices are enveloped in mysteries: their oratories are always stand alone, and are constantly situated on eminences: in these they hold their secret assemblies, to which women are admitted. It is pretended they perform ceremonies there in presence of a small statue resembling an ox or a calf; whence some have pretended to prove that they are descended from the Samaritans. But besides that the fact is not well attested, the worship of the ox may be deduced from other sources.

They have one or two books which they conceal with
with the greatest care: but chance has deceived their
jealousy: for in a civil war which happened 9 or 10
years ago, the emir Youfef, who is Djiah or ignor-
ant, found one among the people one of their
enemies. M. Volney was assured, by persons who had
read it, that it contains only a mytical jargon, the ob-
scurity of which doubtless renders it valuable to adepts.
Hakem Bamr-ellah is there spoken of, by whom they
mean God incarnated in the person of the caliph. It
likewise treats of another life, of a place of punish-
ment, and a place of happiness where the Okkals hall
carried to most distinguised. Several degrees of
perfection are mentioned, to which they arrive by suc-
cessive trials. In other respects, these sectaries have
all the insolence and all the fears of superstition: they
are not communicative, because they are weak; but it
is probable that, were they powerful, they would be
promulgators and intolerant.

The rest of the Druzes, strangers to this spirit, are
wholly indifferent about religious matters. The Chris-
tians who live in their country pretend that several of
them believe in the metempsychois: that others wor-
ship the sun, moon, and stars: all which is possible;
for, as among the Anfaria, every one, left to his own
fancy, follows the opinion that pleases him

The greater part are cultivators, either
farmers or proprietors; everyman lives on his
produce; and, like them, make use of holy water.
Many of them, importuned by the millionaries, suffer
themselves to be baptized; and if solicited by the
Turks, receive circumcision, and conclude by dying
neither Christians nor Mahometans: but they are not
so indifferent in matters of civil policy.

The Druzes may be divided into two classes: the com-
mon people; and the people of eminence and property,
distinguished by the title of Shaiks and emirs, or decei-
dants of princes. The greater part are cultivators, either
as farmers or proprietors; every man lives on his inher-
tance, improving his mulberry-trees and vineyards: in
some districts they grow tobacco, cotton, and some grain,
but the quantity of these is inconsiderable. It appears
that at first all the lands were, as formerly in Europe,
in the hands of a small number of families. But to
render them productive, the great proprietors were for-
ced to fell part of them, and let leases; which
subdivision is the chief source of the power of the
state, by multiplying the number of persons interested
in the public weal: there still exists, however, some
traces of the original inequality, which even at this
day produces pernicious effects. The great property
possessed by some families gives them too much influ-
ence in all the measure of the nation; and their pri-
ivate interests have too great weight in every public
transaction. Their history, for some years back, af-
fords sufficient proofs of this; since all the civil or for-

The chief, called Hakem or governor, also Emir
or prince, is a sort of king or general, who unites in
his own person the civil and military powers. His
dignity is sometimes transmitted from father to son,
sometimes from one brother to another; and the suc-
cession is determined rather by force than any certain
laws. Females can in no case pretend to this inheri-
tance. They are already excluded from succession in
civil affairs, and consequently can still less expect it
in political: in general, the Asiatic governments are
more turbulent, and their administration renders military
talents too necessary, to admit of the sovereignty of
women. Among the Druzes, the male line of any fa-
mony being extinguished, the government devolves to
him who is in possession of the greatest number of suf-
frages and resources. But the first step is to obtain
the approbation of the Turks, of whom he becomes
the vassal and tributary. It even happens, that, not
unfrequently to avert their supremacy, they name the
Hakem, contrary to the wishes of the nation, as in
the case of Ismael Haibeya, raised to that dignity by
Djezzar; but this constraint lasts no longer than it is
maintained by that violence which gave it birth. The
office of the governor is to watch over the good order
of the state, and to prevent the Emirs, Shaiks, and
villages, from making war on each other: in case of
defection, he may employ force. He is also at
the head of the civil power, and names the Caids,
only always referring to himself the power of life and
death. He collects the tribute, from which he an-
ually pays to the pasha a stated sum. This tribute
varies in proportion as the nation renders itself more
or less formidable: at the beginning of this cen-
tury it amounted to 160 purses, L. 8330; but Mel-
heim forced the Turks to reduce it to 60. In 1784,
Emir Youfef paid 80 and promised 90. This tribute,
which is called Miri, is imposed on the mulberry-trees,
vineyards, cotton, and grain. All fow land pays in
proportion to its extent; every foot of mulberries is
taxed at three medins, or three fols nine deniers (not
quite two-pence). A hundred feet of vineyard pays
a piastra or 40 medins; and fresh measurements are
often made to prejudice a just proportion. The Shaiks
and emirs have no exemption in this respect: and it
may be truly said they contribute to the public stock in
proportion to their fortune. The collection is made
almost without expense. Each man pays his conting-
ent at Dair-el-Kamar, if he pleases, or to the collec-
tors of the prince, who make a circuit round the coun-
try after the crop of silks. The surplus of this tribute
is for the prince: so that it is his interest to reduce the
demands of the Turks, as it would be likewise to aug-
ment the impost: but this measure requires the function
of the Shaiks, who have the privilege of opposing it.
Their consent is necessary, likewise, for peace and war.
In these cases, the emir must convocate general assem-
bles, and lay before them the state of his affairs. There
every Shaik, and every peasant who has any reputation
for courage or understanding, is invited to give his
suffrage; so that this government may be considered a
well-proportioned mixture of monarchy, aristocracy
and democracy. Everything depends on circumstan-
ces:
Of stone; from whence their fire is the more dangerous, as they are covered, fire at their ease, and by hunting and military sports have acquired the habit of hitting a mark with great dexterity. They are accustomed to sudden inroads, attacks by night, ambuscades, and all those coups de main which require to fall suddenly on, and come to close fight with the enemy. Ardent in improving their successes, easily dispirited, and prompt to reclame their courage; daring, even to temerity, and sometimes ferocious, they poldes above all two qualities essential to the excellency of any troops; they strictly obey their leaders, and are endowed with a temperance and vigour of health at this day unknown to most civilized nations. In the campaign of 1784, they passed three months in the open air without tents, or any other covering than a sheep-skin; yet were there not more deaths or maladies than if they had remained in their houses. Their provisions consisted, as at other times, of small loaves baked on the ashes or on a brick, raw onions, cheese, olives, fruits, and a little wine. The table of their chiefs was almost as frugal; and we may affirm, that they subsisted 100 days, on what the same number of Englishmen or Frenchmen would not have lived ten. They have no knowledge of the science of fortification, the management of artillery or encampments, nor, in a word, any thing which constitutes the art of war. But had they among them a few persons versed in military science, they would readily acquire its principles, and become a formidable folldiery. This would be the more easily effected, as their mulberry plantations and vineyards do not occupy them all the year, and they could afford much time for military exercises."

By the last estimates, according to M. Volney's information, the number of men able to bear arms was 40,000, which supposes a total population of 120,000: no additionconstitutesto this calculation, since there are no Druzes in the cities or on the coast. As the whole country contains only 110 square leagues, there results for every league 1000 persons; which is equal to the population of our richest provinces. To render this more remarkable, it must be observed that the soil is not fertile, that a great many eminences remain uncultivated, that they do not grow corn enough to support themselves three months in the year, that they have no manufactures, and that all their exportations are confined to figs and cottons, the balance of which exceeds very little the importation of corn from the Hauran, the oils of Palestine, and the rice and coffee they procure from Bairent. Wherefore arise that such a number of inhabitants within fo small a space? "I can discover no other cause (says our author), than that ray of liberty which glimmers in this country. Unlike the Turks, every man lives in a perfect security of his life and property. The peasant is not richer than in other countries; but he is free. 'He fears not,' as I have often heard them say, 'that the Aga, the Kaimmakam, or the Pacha, should send their Djendis to pillage his house, carry off his family, or give him the baffalino.' Such oppressions are unknown among these mountains. Security, therefore, has been the original cause of population, from that inherent desire which all men have to multiply themselves wherever they find an easy subsistence. The frugality of the nation which is content with little, has been a secondary, and not less powerful reason; and a third is the emigration.
emigration of a number of Christian families, who daily defert the Turkish provinces to settle in Mount Lebanon, where they are received with open arms by the Maronites from similarity of religion, and by the Druzes from principles of toleration, and a conviction how much it is the interest of every country to multiply the number of its cultivators, consumers, and allies.

"The comparison which the Druzes often have an opportunity of making between their situation and that of other subjects of the Turkish government, has given them an advantageous opinion, of their superiority. Commerce, by a natural effect, has an influence on their personal character. Exempt from the violence and insults of despotism, they consider themselves as more perfect than their neighbours, because they have the good fortune not to be equally debased. Hence they acquire a character more elevated, energetic, and active; in short, a genuine republican spirit. They are considered throughout the Levant as refteis, enterprising, hardy, and brave even to temerity. Only 300 of them have been seen to enter Damascus in open day, and spread around them terror and carnage. No people are more nice than they with respect to the point of honour: Any offence of that kind, or open insult, is instantly punished by blows of the kandjur or the mukht, while among the inhabitants of the towns, it only excites injurious retorts. This delicacy has occasioned in their manners and discourse a reserve, or, if you will, a politeness which one is astonished to discover among peasants. It is carried even to dissimulation and falsehood, especially among the chiefs, whose greater interests demand greater attentions. Circumpection is necessary to all, from the formidable consequences of that retaliation of which I have spoken. These customs may appear barbarous to us; but they have the merit of supplying the deficiency of regular justice, which is necessarily tedious and uncertain in these disorderly and almost anarchical governments.

"The Druzes have another point of honour, that of hospitality. whoever presents himself at their door in the quality of a suppliant or passenger, is sure of being entertained with lodging and food in the most generous and unaffected manner. M. Volney often saw the lowest peasants give the last morsel of bread they had in their houses to the hungry traveller; and when it was observed to them that they wanted prudence, their answer was, 'God is liberal and great, and all men are brethren.' There are, therefore, no inns in their country any more than in the rest of Turkey. When they have once contracted with their guest the sacred engagement of bread and salt, no subsequent event can make them violate it. Various instances of this are related, which do honour to their character. A few years ago, an aga of the janissaries having been engaged in a rebellion, fled from Damascus and retired among the Druzes. The pacha was informed of this, and demanded him of the emir, threatening to make war on him in case of refusal. The emir demanded him of the shaik Talhouk, who had received him; but the indignant shaik replied, 'When have you known the Druzes deliver up their guests?' Tell the emir, that as long as Talhouk shall preserve his beard, not a hair of the head of his suppliant shall fall! The emir threatened him with force; Talhouk armed his family. The emir, dreading a revolt, adopted a method practised as juridical in that country. He declared to the shaik, that he would cut down 50 mulberry-trees a-day until he should give up the aga. He proceeded as far as a thousand, and Talhouk still remained inflexible. At length the other shaiks, enraged, took up the quarrel; and the commotion was about to become general, when the aga, reproaching himself with being the cause of so much mischief, made his escape without the knowledge even of Talhouk.

"The Druzes have also the prejudices of the Bedouins respecting birth; like them they pay great respect to the antiquity of families; but this produces no essential inconveniences. The nobility of the emirs and shaiks does not exempt them from paying tribute in proportion to their revenues. It confers on them no prerogatives, either in the attainment of landed property or public employments. In this country, no more than in all Turkey, are they acquainted with game-laws, or glebes, or feignorial or ecclesiastical tithes, frank fees or alienation fines; every thing is held in freehold: Every man, after paying his miri and his rent, is master of his property. In short, by a particular privilege, the Druzes pay no fine for their succession; nor does the emir, like the sultan, arrogate to himself original and universal property; there exists nevertheless, in the law of inheritance, an imperfection which produces disagreeable effects. Fathers have, as in the Roman law, the power of preferring such of their children as they think proper: hence it has happened in several families of the shaiks, that the whole property has centered in the same person, who has perverted it to the purpose of intriguing and caballing, while his relations remain, as they will express it, princess of olives and dates: that is to say, poor as peasants.

"In consequence of their prejudices, the Druzes do not choose to make alliances out of their own families. They invariably prefer their relation, though poor, to a rich stranger; and poor peasants have been known to refuse their daughters to merchants of Saide and Bairout, who pleaded from twelve to fifteen thousand piasters. They observe also, to a certain degree, the custom of the Hebrews, which directed that a brother should espouse his brother's widow; but this is not peculiar to them, for they retain that as well as several other customs of that ancient people, in common with other inhabitants of Syria and all the Arab tribes.

"In short, the proper and distinctive character of the Druzes is a sort of republican spirit, which gives them more energy than any other subjects of the Turkish government, and an indifference for religion, which forms a striking contrast with the zeal of the Mahometans and Christians. In other respects, their private life, their customs, and prejudices, are the same with other orientals. They may marry several wives, and repudiate them when they choose; but, except by the emir and a few men of eminence, that is rarely practised. Occupied with their rural labours, they experience neither artificial wants, nor those inordinate passions, which are produced by the idleness of the inhabitants of cities and towns. The veil, worn by their women, is of itself a preservative against those defects which are the occasion of so many evils in society.
city. No man knows the face of any other woman than his wife, his mother, his sister, and sisters-in-law. Every man lives in the bosom of his own family, and goes little abroad. The women, these even of the shaiks, make the bread, roast the coffee, wash the linen, cook the viands, and perform all domestic offices. The men cultivate their lands and vineyards, and dig canals for watering them. In the evening they sometimes assemble in the court, the area, or house of the chief of the village or family. There, seated in a circle, with legs crossed, pipes in their mouths, and poniards at their belts, they discourse of their various labours, the scarcity or plenty of their harvests, peace or war, the conduct of the emir, or the amount of the taxes; they relate past transactions, discuss present interests, and form conjectures on the future. Their children tired with play come frequently to listen; and a stranger is surpriz'd to hear them, at ten or twelve years old, recounting, with a serious air, why Djezzar declared war against the emir Yousif, how many purfes he coat that prince, what augmentation there will be of the miris, how many milkbells there were in the camp, and who had the beet mare. This is their only education. They are neither taught to read the psalms as among the Maronites, nor the Koran of the Mahometans; hardly do the ishaiks know how to write a letter. But if their mind be deficiente of useful or agreeable information, at least it is not occupied by false and hurful ideas; and, without doubt, such natural ignorance is well worth all our artificial folly. This advantage results from it, that their understandings being nearly on a level, the inequality of conditions is less perceptible. For, in fact, we do not perceive among the Druzes that great distance which, in most other societies, degrades the inferior, without contributing to the advantage of the great. All, whether shaiks or peafants, treat each other with that rational familiarity, which is equally remote from rudeness and servility. The grand emir himself is not a different man from the rest: he is a good country gentleman, who does not disdain admitting to his table the meanest farmer. In a word, their manners are those of ancient times, and of that rustic life which marks the origin of every nation; and prove that the people among whom they are still found are as yet only in the infancy of the social state."

DRUSIUS (John), a Protestant writer of great learning, born at Oudenarde in Flanders in 1555. He was designed for the study of divinity; but his father being outlawed, and deprived of his estate, they both retired to England, where the son became professor of the oriental languages at Oxford; but upon the pacification of Ghent, they returned to their own country, where Drusius was also appointed professor of the oriental languages. From thence he removed to Friesland, where he was admitted Hebrew professor in the university of Franeker; the functions of which he discharged with great honour till his death in 1616. His works show him to have been well skilled in Hebrew; and the States General employed him in 1600 to write notes on the most difficult passages in the Old Testament, with a pension of 400 florins a-year; but being frequently disturbed in this undertaking, it was not published till after his death. He held a vaft correspondence with the learned; for besides letters in Hebrew, Greek, and other languages, there were found 2300 Latin letters among his papers. He had a son John, who died in England at 37, and was a prodigy for his early acquisition of learning: he wrote Notes on the Proverbs of Solomon, with many letters and verses in Hebrew.

DRYADS, in the heathen theology, a sort of deities, or nymphs, which the ancients thought inhabited groves and woods. They differed from the Hamadryades: these latter being attached to some particular tree, with which they were born, and with which they died; whereas the Dryades were goddesses of trees and woods in general. See Hamadryades.

DRYAS, in botany: A genus of the polygynia order, belonging to the isocandria class of plants; and in the natural method ranking under the 35th order, Sentiose. The calyx is oblong; the petals eight; the seeds long and hairy with a train.

DRYDEN (John), one of the most eminent English poets of the 17th century, descended of a genteel family in Huntingdonshire, was born in that county at Oldwincle 1631, and educated at Westminster school under Dr Bully. From thence he was removed to Cambridge in 1650, being elected scholar of Trinity-college, of which it appears, by his Epithalamium Cantabrigiens. 4to, 1662, to have afterwards been a fellow. Yet in his earlier days he gave no extraordinary indication of genius; for even the year before he quitted the university, he wrote a poem on the death of Lord Haftings, which was by no means a preface of that amazing perfection in poetical powers which he afterwards poli'ded.

On the death of Oliver Cromwell he wrote some heroic stanzas to his memory; but on the Restoration, being devout of ingratiating himself with the new court, he wrote first a poem intituled Afrisa Redux, and afterwards a panegyric to the King on his coronation. In 1662, he addressed a poem to the lord chancellor Hyde, presented on New Year's day; and in the same year a satire on the Dutch. In 1668 appeared his Annaus Mirabilis, which was a historical poem in celebration of the duke of York's victory over the Dutch. These pieces at length obtained him the favour of the crown; and Sir William Davenant dying the same year, Mr Dryden was appointed to succeed him as poet laureat. About this time also his inclination to write for the stage seems first to have shown itself. For besides his concern with Sir William Davenant in the alteration of Shakespeare's Tempest, in 1669 he produced his Wild Gallants, a comedy. This met with very indifferent success; yet the author, not being discouraged by its failure, soon published his Indian Emperor. This finding a more favourable reception, encouraged him to proceed; and that with such rapidity that in the key to the Duke of Buckingham's Rehearsal he is recorded to have engaged himself by contract for the writing of four plays per year; and, indeed, in the years 1679 and 1680 he appears to have fulfilled that contract. To this unhappy necessity that our author lay under, are to be attributed all those irregularities, those bombastic flights, and sometimes even puerile exuberances, for which he has been so severely criticized; and which, in the unavoidable hurry in which he wrote, it was impossible he should find time either for stopping or correcting.
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In 1675, the Earl of Rochester, whose envious and malevolent disposition would not permit him to see growing merit meet with its due reward, and was therefore sincerely charmed at the very first applause with which Mr Dryden's dramatic pieces had been received, was determined if possible to shake his interest at court; and succeeded so far as to recommend Mr Crowne, an author by no means of equal merit, and at that time of an obscure reputation, to write a mask for the court, which certainly belonged to Mr Dryden's office as poet laureat. — Nor was this the only attack; nor indeed the most potent one, that Mr Dryden's judicious acquirement of fame drew on him. For some years before the Duke of Buckingham, a man of much better character than Lord Rochester, had most severely ridiculed several of our author's plays in his admired piece called the Rehearsal. — But though the intrinsic wit which run through that performance cannot even to this hour fail of exciting our laughter, yet at the same time it ought not to be the standard on which we should fix Mr Dryden's poetical reputation. For though the pieces there ridiculed are not any of those looked on as the chef d'œuvres of this author; that the very passages burlesqued are frequently, in their original places, much less ridiculous than when thus detached, like a rotten limb, from the body of the work, and exposed to view with additional distortions, and diverted of that connection with the other parts, which, while preserved, gave it not only symmetry but beauty; and lastly, that the various imitable beauties, which the critic has sunk in oblivion, are infinitely more numerous than the deformities which he has thus industriously brought forth to more immediate inspection.

Mr Dryden, however, did not suffer these attacks to pass with impunity; for in 1679 there came out an Essay on Satire, said to be written jointly by that gentleman and the Earl of Mulgrave, containing some very severe reflections on the Earl of Rochester and the Dukes of York and Newcastle, who, it is not improbable, may be a sort of instrument in the above mentioned affront shown to Mr Dryden; and in 1681 he published his Abolam and Achitophel, in which the well-known character of Zimri, drawn for the Duke of Buckingham, is certainly severe enough to repay all the ridicule thrown on him by that nobleman in the character of Bays. — The resentment shown by the different peers was very different. Lord Rochester, who was a coward as well as a man of the most depraved morals, basely hired three buffoons to cudgel Dryden in a coffee-house: but the Duke of Buckingham, as we are told, in a more open manner, took the task upon himself: and at the same time preferred him with a purse containing no very large sum of money, telling him, that he gave him the beating as a punishment for his impudence, but believed that gold on him as a reward for his wit.

In 1680 was published a translation of Ovid's Epistles in English verse by several hands, two of which, together with the preface, were by Mr Dryden; and in 1682 came out his Religio Laici, designed as a defence of revealed religion, against Deists, Papists, &c. Soon after the accession of King James II. our author changed his religion for that of the church of Rome, and wrote two pieces in vindication of the Romish tenets; viz. A Defence of the Papers written by the late King, found in his strong box; and the celebrated poem, afterwards answered by Lord Halifax, intitled the Hind and the Panther. — By this extraordinary step he not only engaged himself in controversy, and incurred much censure and ridicule from his contemporaries; but on the completion of the Revolution, being, on account of his newly-chosen religion, disqualified from bearing any office under the government, he was stripped of the laurel, which, to his still greater mortification, was bestowed on Richard Flecknoe, a man to whom he had a most settled aversion. This circumstance occasioned his writing the very severe poem called Mac Flecknoe.

Mr Dryden's circumstances had never been affluent; but now he was deprived of this little support, he found himself reduced to the necessity of writing for mere bread. We consequently find him from this period engaged in works of labour as well as genius, viz. in translating the works of others; and this necessity the British nation stands indebted for some of the best translations extant. In the year he lost the laurel, he published the life of St. Francis Xavier from the French. In 1693 came out a translation of Juvenal and Persius; in the first of which he had a considerable hand, and of the latter the entire execution. In 1695 was published his prose version of Psalms of Painting; and the year 1697 gave the world that translation of Virgil's works entire, which still does, and perhaps ever will, stand foremost among the attempts made on that author. The petit pieces of this eminent writer, such as prologues, epilogues, epistles, elegies, songs, &c. are too numerous to specify here, and too much dispersed to direct the reader to. The greatest part of them, however, are to be found in a collection of miscellanies in 6 vols. 12mo. His last work is what is called his Fables, which consists of many of the most interesting stories in Homer, Ovid, Boccace, and Chaucer, translated or modernized in the most elegant and poetical manner; together with some original pieces, among which is that amazing ode on St. Cecilia's day, which, though written in the autumn of the author's life, and at a period when old age and diffidence aspired as it were to damp his poetic ardor and clip the wings of fancy, yet poises so much of both, as would be sufficient to have rendered him immortal had he never written a single line besides.

Dryden married the lady Elizabeth Howard, sister to the Earl of Berkshire, who survived him eight years; though for the last four of them she was a lunatic, having been deprived of her senses by a nervous fever. — By this lady he had three sons; Charles, John, and Henry. Of the eldest of these there is a circumstance related by Charles Wilton, Esq; in his Life of Congreve, which seems so well attested, and is itself of so extraordinary a nature, that we cannot avoid giving it a place here. — Dryden, with all his underhanding, was weak enough to be fond of judicial astrology, and used to calculate the nativity of his children. When his lady was in labour with his son Charles, he being told it was decent to withdraw, laid his watch on the table, begging one of the ladies then present, in a most solemn manner, to take exact notice of the very minute that the child was born; which she did, and acquainted him with it. About a week after, when his lady was pretty well recovered, Mr Dryden took
Dryden. occasion to tell her that he had been calculating the child's nativity; and observed, with grief, that he was born in an evil hour for Jupiter, Venus, and the Sun, were all under the earth, and the lord of his ascendant afflicted with a hateful square of Mars and Saturn. If he lives to arrive at the 8th year, 'tis said, he 'll go near to die a violent death on his very birth-day; but if he should escape, as I see but small hopes, he will in the 23d year be under the very same evil direction; and if he should escape that also, the 33d or 34th year is, I fear. Here he was interrupted by the immoderate grief of his lady, who could no longer hear calamity prophesied to befall her son. The time at last came, and August was the insidious month in which young Dryden was to enter into the eighth year of his age. The court being in progress, and Mr Dryden at his manor in Charlton in Wilts; his lady was invited to her uncle Mordaunt's to pass the remainder of the summer. When they came to divide the children, lady Elizabeth would have him take John, and suffer her to take Charles: but Mr Dryden was too absolute, and they parted in anger; he took Charles with him, and she was obliged to be content with John. When the fatal day came, the anxiety of the lady's spirits occasioned such an effervescence of blood, as threw her into so violent a fever, that her life was despaired of; till a letter came from Mr Dryden, reproving her for her wanton credulity, and affuring her that her child was well; which recovered her spirits, and in six weeks after she received an alleviation of the whole affair. Mr Dryden, either through fear of being reckoned superfluous, or thinking it a science beneath his study, was extremely cautious of letting any one know that he was a dealer in astrology; therefore could not excuse his absence on his son's anniversary, from a general hunting-match which lord Berkshire had made, to which all the adjacent gentlemen were invited. When he went out, he took care to set the boy a double exercise in the Latin tongue, which he taught his children himself, with a strict charge not to flir out of the room till his return; well knowing the talk he had left him would take up longer time. Charles was performing his duty in obedience to his father; but, as all fate would have it, the flag made towards the house, and the noise alarming the servants, they hasted out to see the sport. One of them took young Dryden by the hand, and let him out to see it also; when, just as they came to the gate, the flag being at bay with the dogs, made a bold push, and leaped over the court-wall, which was very low and very old; and the dogs following, threw down a part of the wall 10 yards in length, under which Charles Dryden lay buried. He was immediately dug out; and after six weeks languishing in a dangerous way, he recovered. Sófar Dryden's prediction was fulfilled. In the 23d year of his age, Charles fell from the top of an old tower belonging to the Vatican at Rome, occasioned by a swimming in his head with which he was fized, the heat of the day being excessive. He again recovered, but was ever after in a languishing sickly state. In the 33d year of his age, being returned to England, he was unhappily drowned at Windfie. He had with another gentleman swam twice over the Thames; but returning a third time, it was supposed he was taken with the cramp, because he called out for help, though too late. Thus the father's calculation proved but too prophetic.

At last, after a long life, harassed with the most labours of all fatigue, viz. that of the mind, and continually made anxious by disfuels and difficulty, our author departed this life on the first of May 1701. The day after Mr Dryden's death, the dean of Westminster sent word to Mr Dryden's widow, that he would make a present of the ground and all other abbey-fees for the funeral: the Lord Halifax likewise sent to the lady Elizabeth, and to Mr Charles Dryden, offering to defray the expenses of our poet's funeral, and afterwards to beftow 500l. on a monument in the abbey; which general offer was accepted. Accordingly, on Sunday following, the company being assembled, the corpse was put into a velvet hearse, attended by 15 mourning coaches. When they were just ready to move, Lord Jefferys, son of Lord Chancellor Jefferys, a name dedicated to infamy, with one of his rakish companions, riding by, asked whose funeral it was; and being told it was Mr Dryden's, he protested he should not be buried in that private manner; that he would himself, with the lady Elizabeth's leave, have the honour of the interment, and would bestow 100l. on a monument in the abbey. This put a stop to their procession; and the Lord Jefferys, with several of the gentlemen who had alighted from their coaches, went up stairs to the lady, who was sick in bed. His lordship repeated the purport of what he had said below; but the lady Elizabeth refusing her consent, he fell on his knees, vowing never to rise till his request was granted. The lady under a fallen surprize fainted away; and Lord Jefferys, pretending to have obtained her consent, ordered the body to be carried to Mr Ruffell's an undertaker in Cheapside, and to be left there till further orders. In the mean time the abbey was lighted up, the ground opened, the choir attending, and the bishop waiting for some hours to no purpose for the corpse. The next day Mr Charles Dryden waited on the Lord Halifax and the bishop; and endeavoured to excuse his mother, by relating the truth. Three days after, the undertaker having received no orders, waited on the Lord Jefferys; who pretended that it was a drunken frolic, that he remembered nothing of the matter, and he might do what he pleased with the body. Upon this the undertaker waited upon the lady Elizabeth, who defir'd a day's reprieve, which was granted. Mr Charles Dryden immediately wrote to the Lord Jefferys, who returned for answer that he knew nothing of the matter, and would be troubled no more about it. Mr Dryden hereupon applied again to Lord Halifax and the Bishop of Rochester, who absolutely refused to do any thing in the affair.

In this disfuels, Dr Garth, who had been Mr Dryden's intimate friend, sent for the corpse to the college of physicians, and proposed a subscription; which succeeding, about three weeks after Mr Dryden's decease, Dr Garth pronounced a fine Latinoration over the body, which was conveyed from the college, attended by a numerous train of coaches to Westminster-abbey, but in very great disorder. At last the corpse arrived at the abbey, which was all unlighted. No organ played,
ed, no anthem sung; only two of the singing boys preceding the corpse, who sung an ode of Horace, with each a small candle in their hand. When the funeral was over, Mr Charles Dryden sent a challenge to Lord Jefferys; who refusing to answer it, he sent several others, and went often himself; but could neither get a letter delivered, nor admittance to speak to him: which so incensed him, that finding his Lordship refused to answer him like a gentleman, he resolved to fight, though with all the rules of honour, which his Lordship having quitted the town, and Mr Charles never had an opportunity to meet him, though he fought it to his death with the utmost application.

Mr Dryden had no monument erected to him for several years; to which Mr Pope alludes in his epitaph intended for Mr Rowe, in this line,

Beneath a rude and nameless stone he lies.

In a note upon which we are informed that the tomb of Mr Dryden was erected upon this hint by Sheffield duke of Buckingham, to which was originally intended this epitaph:

This Sheffield rais'd.—The sacred dust below

Was Dryden once; the rest who heard his name?

Which was since changed into the plain inscription now upon it, viz.

J. DRYDEN,
Natus Aug. 9. 1631.
Mortuus Maii. 1. 1700.

My Dryden's character has been very differently drawn by different hands, some of which have exalted it to the highest degree of commendation, and others debated it by the severest censure.—The latter, however, we must charge to that strong spirit of party which-prevalled during great part of Dryden's time, and ought therefore to be taken with great allowances. Were we indeed to form a judgment of the author from some of his dramatic writings, we should perhaps be apt to conclude him a man of the most licentious morals; many of his comedies containing a great share of obscenity, even extending to obscenity: But if we consider, that, as the poet tells us,

Thou who live to please, must please to live;

if we then look back to the scandalous licence of the age he lived in, the indifference which at times he underwent, and the necessity he consequently lay under of complying with the public taste however depraved; we shall surely not refuse our pardon to the compelled writer, nor our credit to those of his contemporaries who were intimately acquainted with him, and who have ascribed to us there was nothing remarkably vicious in his personal character.

From some parts of his history he appears unstable, and to have too readily temporized with the severest revolutions in church and state. This however might in some measure have been owing to that natural timidity and diffidence in his disposition, which almost all the writers seem to agree in his poëtery. Congreve, whose authority cannot be in question, has given us such an account of him, as makes him appear no less amiable in his private character as a man, than he was illustrious in his public one as a poet. In the former light, according to that gentleman, he was humane, compassionate, forgiving, and sincerely friendly: of an extensive reading, a tenacious memory, and a ready communication: gentle in the correction of the writings of others, and patient under the reprehension of his own deficiencies: easy of access himself, but slow and difficult in his advances to others; and of all men the most modest and the most easy to be disconcerted in his approaches either to his superiors or his equals. As to his writings, he is perhaps the happiest in the harmony of his numbers, of any poet who ever lived either before or since his time, nor is Mr Pope himself excepted. His imagination is ever warm, his figures noble, his descriptions beautiful, and his sentiments just and becoming. In his prose he is poetical without bombast, concise without pedantry, and clear without prolixity. His dramatic have, perhaps, the least merit of all his writings. Yet there are many of them which are truly excellent, though he himself tells us that he never wrote anything in that way to please himself but his All for Love. This last, indeed, and his Spanish Friar, may be reckoned two of the best plays our language has been honoured with.

DYPIS, in botany: A genus of the trigynia order, belonging to the pentandra clafs of plants; and in the natural method ranking under the 22d order, Caryophyllie. The calyx is quinquedentated; the petals five; the opening at the capsule as if cut round horizontally, monoporous.

DUBLIN, the metropolis of Ireland, the second city in the British dominions, and esteemed the fifth for magnitude in Europe, is situated in the province of Leinster, in the county of Dublin, at the bottom of a large bay. The river Liffey, which here difembogues itself into the ocean, divides the town into nearly two equal parts. Formerly the city of Dublin was confined to the south side of the river: it was a place of great antiquity. Poemly, who flourished in the reign of Antonius Pius, about the year 140, says, it was anciently called Aflbeaed. In 155, Alpinus, whose daughter Auliana was drowned in the Liffey, changed the name from Aflbead to Auliana. It was afterwards named Dubhiana, and Poemly calls it Eebiana. Dubhiana, whence comes Dublinum and Dublin, is evidently derived from Dub-leana, "the place of the black harbour or lake," or rather "the lake of the sea," the bay of Dublin being frequently so called. This city has had a variety of names. The Irish call it Drom-choll-coil, "the brow of a hazel wood," and in 183, Eogan king of Munster being on a royal tour, paid a visit to this place, which was then called Aitha Clisath-Dubb-Line, "the passage of the ford of hurdles over the black pool:" the harbour of Dublin was likewise known by the name of Lean-Clisath, or Lean-Clisath, from Lean or Leam, "a harbour," and from Clisath or Clisabb, which literally signifies "a hurdle or anything made of wicker-work;" it also signifies certain wires formed with hurdles, and placed in rivers and bays by the ancient Irish for the purpose of taking fish: whence any river or bay where in these wires were fixed had the name of Clisath or Clisabb annexed to it, to signify the establishment of a fishery. Dublin, therefore, being originally built on or near one of these harbours, was anciently called Bally-lean-Clisath, that is, the town on the fishing harbour. It is described at the present day in the Irish language by the appellation of Ath-Clisath, "the ford of hurdles," and Bally-athe-Clisath, "the town of the
ford of hurdles," the inhabitants having formerly had access to the river by hurdles laid on the low marshy grounds adjoining the water: and this name was also extended to the north side of the river, from a temporary bridge of hurdles thrown over the Anna Liffey, a corruption of Aula Lothii, or "the swift river," so termed from the rapidity of the mountain floods. This side was enlarged by Mac Turkill the Danilh prince, who, notwithstanding, fixed his habitation on the south side, and abandoned the northern town; which, from the original country of the invaders, was called Eamsanteun, since corrupted to Osmanteun. King Edgar, in the preface to his charter dated 964, mentions Ireland with its most noble city (nobilissimam civitatem) of Dublin. By the英语ians it is called Diselin, and by the Welch Dinis-Dulin, or the city of Dublin.

In 448, Alpin, chief of Dublin and all his subjects, were converted to Christianity by St. Patrick.

In the year 989, the Olmen or Danes, having entered the Liffey with a fleet of 600 sail, made themselves masters of Dublin and the adjacent country, and soon after enquired the city with walls. About 1170 Dermot Mac Murrough, king of Leinster, having quarrelled with the other princes of the kingdom, a confederacy was formed against him by Roderick O'Conor, monarch of Ireland. Dermot applied to Henry II. king of England, who sent over a number of English adventurers, by whose assistance he was re-instituted in his dominions; and in the year 1171, the descendants of the Danes still continuing to hold possession of Dublin, it was besieged and taken by a powerful party of the English under Raymond le Gros. Mac Turkill the Danish king escaped to his shipping: he returned, however, soon after with a strong fleet to recover the city, but was killed in the attempt, and in him ended the race of earlierling princes in Ireland.

In 1172, Henry II. landed at Waterford, and obtained from Richard earl of Strongbow (who married the daughter of Dermot Mac Murrough, and by compact was his successor) a surrender of the city of Dublin, where he built a pavilion of wicker work near St. Andrew's church, then situated where Custom-house lately stood, and there entertained several Irish princes, who voluntarily submitted to him, on condition of being governed by the same laws as the people of England. Henry also held a parliament here. In 1173 he granted his first charter to Dublin, and by divers privileges encouraged a colony from Bristol to settle here.

In 1210, upwards of 20 Irish princes swore allegiance to John at Dublin; engaging to establish the English laws and customs in the kingdom; and in the same year courts of judicature were instituted. In 1216, magna charta was granted to the Irish by Henry III. an entry of which was made in the red book of the exchequer at Dublin. In 1217, the city was granted to the citizens in fee farm at 200 marks per annum; and in 1227 the above monarch ordained that the charter granted by king John should be kept inviolably. In 1404, the statutes of Kilkenny and Dublin were confirmed in a parliament held at this city under the earl of Ormond. The charter of the city of Dublin was renewed in 1609 by James I.

The civil government of the city was anciently under the management of a provost and bailiffs; in 1328, John le Decer was appointed the first provost, and Richard de St Olave and John Steakbold bailiffs. In 1409, the title of the chief magistrate was changed to that of mayor, when Thomas Cusack was appointed to the office, Richard Bour and Thomas Shortail being bailiffs; the office of bailiffs was changed to sheriffs in 1547. In 1660, Charles II gave a collar of S. and a company of foot guards to the mayor; and in 1665, this monarch conferred the title of lord mayor on the chief magistrate, to whom he also granted 500, per annum in lieu of the foot company. Sir Daniel Bellingham was the first lord mayor of Dublin; Charles Lovet and John Quelch were sheriffs the same year. In 1762, Arthur earl of Exefex introduced new rules for the better government of the city; and in 1683 the Thosfel was built, for the purpose of the magistrates meeting to hold their courts, assemblies, &c.

In the 10th century, after the fortifications of Dublin were repaired by the Olmen, the walls of the city, including those of the castle, did not occupy more than an Irish mile; they extended from Winetavern-gate to Audeon's-arch, and were continued from thence to where Newgate formerly stood; and from a plan published by John Speed in 1610, it appears that they were continued to Ormond's-gate, or, as it has been since called, Wainwood-gate, from thence to the Old-bridge, and along the banks of the river to a very large portal called Newman's tower, nearly in the present site of the south entrance of Exefex-bridge; and from Newman's tower in an angular direction to Dame's-gate, at the west end of Dame-street. From the gate at the southwest angle of the castle the wall ran to Nicholas-gate, and was continued from thence to Newgate. The principal streets without the walls were, on the west, New-row, Francis-street, Thomas-street, and James's-street; on the south were Patrick-street, Bride-street, and Ship-street; and on the east Dame-street, George's-lane, and Stephen-street. That space of ground now occupied by Crane-lane, Templebar, Fleet-street, Lazar's-hill, or, as it is now called south Townsend-street, Crampton, Afton's, George's, and Sir John Roger's quays, &c. was then overflowed by the Liffey. On the north side of the river there were only Church-street, Mary's-lane, Hammond-lane, and Pile-lane, then built but on one side as far as Mary's-abbey, which terminated the extent of that part of the town to the eastward; Grange-Gorman, Stoney-batter, now called Manor-street, and Glasmanogue, were then villages at some distance from the city; and at the latter the sheriffs have held their courts in times of the plague, as being remote from the tide of infection. In 1664, the inhabitants being numbered amounted to 2565 men and 2986 women, protestants; and 1202 men and 1466 women, Roman catholics, making in the whole 8152.

By comparing this account of the ancient state and boundaries of the metropolis with the following description of its present extent, population, and magnificence, an idea will be readily formed of the amazing increase and improvement it hath experienced within the present century.

Dublin is seated in view of the sea on the east, and a fine country which swells into gently rising emi-

ences on the north and west, while it towers boldly up in lofty mountains that bound the horizon on the south. The city itself cannot be seen to full advantage on entering the harbour: but the approach to it from thence exhibits a fine prospect of the country for improvement and cultivation, intersected with numerous villas, that have a most grateful effect to enliven this delightful scene, which, beginning at the water’s edge, is continued all over the coast to the northward of the bay as far as the eye can reach, and is finely contrasted by a distant view of the Wicklow mountains to the south, where the comical hills, called the Sugar-loaves, contribute not a little, by the singularity of their appearance, to embellish the landscape, so extensive and picturesque as not to be equalled by any natural scenery in Europe, but the entrance of the bay of Naples, to which it bears a very striking resemblance.

The form of Dublin is nearly a square, a figure that includes the largest area proportioned to its circumference. From the royal hospital at Kilmainham, at the western extremity of the town, to the east end of Townsend-street, the length is two miles and an half, and its greatest breadth is computed to be of the same extent: hence the city is about 10 miles in circumference. Its increase within the last twenty years has been amazing: it now contains about 22,000 houses, whose inhabitants are estimated at 156,000.

Dublin, with respect to its streets, bears a near resemblance to London. Some of the old streets were formerly narrow; but this defect is now in a great measure remedied by an act of parliament, passed in 1774, for opening the public avenues, taking down sign-posts, palisades, pent-houses, &c. new paving the streets, and pulling down the foot-passage; and, in 1785, another act passed for the better paving, cleaning, and lighting the city; in consequence of which an additional number of globes with double burners were put up at the distance of 36 feet from each other. These necessary improvements contribute exceedingly to the beauty and convenience of the metropolis: the new streets are wide and commodious, the houses lofty, uniform, and elegant; nor are several of the old streets totally deficient in these respects: Sackville-street, or the Mall, which, though built upwards of 40 years ago, has been included in the number of new streets by all the late geographers (a self-evident proof that those writers had not even seen the city), is a noble avenue, with a gravel walk in the centre, enclosed by a wall of about three feet high; this walk is 36 feet and a half broad, and the distance between it and the palisades fronting the houses, on either side, is 42 feet and a half: when the new culm-houfe is completed, this street will be a moat desirable situation for wholesale merchants, not only on account of its proximity to that building, but its great depth in the rear. Some years ago, it was esteemed one of the finest public avenues in Europe: many of the new streets, however, in this city are now much superior to it in the magnificence and uniformity of the houses. Among these, on the north side of the river, in the same quarter, are Gardiner’s-row, north Great George’s-street, Cranby-row, Cavendish-row, and Palace-row: the last three form a superb square, having the garden of the lying-in-hospital in the centre: the old wall that encompassed the garden has been lately taken down; there is now a full view of this delightful spot surrounded with iron palisades, and upward of 100 globes with double burners disposed at equal distances, which, added to the globes from the surrounding houses, have a most brilliant effect. This square, which, for its size, is not perhaps to be equalled, has lately received the name of Rutland-square, in compliment to his grace the present duke of Rutland, who contributed munificently towards the improvements in the enclosure of the new garden, and the erecting an elegant edifice for a ball and supper rooms, now nearly finished, situated to the east of the hospital.

Among the new streets and buildings on the south side of the river, those wherein persons of distinction reside, lie chiefly to the eastward of the college and Stephen’s-green; which last, though it does not rank with the new buildings, pollutes much grandeur and elegance, being one of the largest squares in Europe: it is an English meadow in circumference, surrounded by a gravel walk, planted on each side with trees; within this walk is a smooth level meadow, having in the centre an equestrian statue of the late king: there are several fine edifices, though almost all differing in the style of their architecture; this variety, however, is esteemed by many rather a beauty than a defect: but, besides the other streets and buildings in this quarter, there is a new square which will be nearly as extensive as Stephen’s-green, called Merrion-square; it was laid out some years ago, by the late lord Fitzwilliam; the buildings are now considerably advanced, and great encouragement has been given by the present noble proprietor: the houses on the north side, which is quite finished, are uniform and lofty; most of them, being carried up with hewn stone to the first story, gives the whole an air of strength, beauty, and magnificence. At the south west angle of Stephen’s-green, a new street has been also opened, called Harcourt-street, in which are several elegant structures that deserve notice, particularly the town residence of the right honourable lord Earlsford.

The principal entrance to the walks of Stephen’s-green is on the west side opposite the end of York-street (which may be properly classed among the new streets), as all the old houses have been pulled down and modern buildings erected in their room. Those parts of the city inhabited by merchants and traders begin to wear a new face; and amongst this number the new buildings of Daine-street on the south side, exhibit an extensive, uniform, and beautiful range of houses all of an equal height: the shop doors and windows are formed by arches, exactly similar in their construction and ornaments, which are finely elegant: when the other side of this street shall be rebuilt, it may be justly pronounced one of the first trading streets in Europe; and Parliament-street, which was built some years ago, is now nearly equal to any trading street in London.

The river Liffey, being banked in through the whole length of the town, exhibits spacious and beautiful quays, where vessels below the bridge load and unload before the merchants’ doors and warehouses: it is navigable as far as Essex-bridge. This bridge was first built in 1681, and took its name from the unfortunate

It was taken down in 1753, and rebuilt in an elegant form, after the model of Westminster bridge, but much better proportioned, and on a more secure foundation. It has five arches, the buttresses between which support semicircular niches that project from the parapet; there are ballustrades between these niches, and continued to the ends of the bridge, which is commodiously flagged for foot passages; the whole constructed with hewn stone in a very fine taste. There are four bridges besides this over the river; three of which have nothing to recommend them, further than the antiquity of the Old-Bridge, which was erected in this city at a very early period, when it had the name of Dublin-Bridge; it was rebuilt in 1428, since which time it received its present title. Bloody-bridge, built in 1671, was originally constructed with wood, and derives its present harth appellation from an attempt to break it down, wherein four persons were killed. Ormond-bridge was built in 1684, during the time it received its present title. Bloody-bridge, now called Quay-bridge, was erected in the same year; but, being destroyed by the floods in 1769, was rebuilt of hewn stone, and finished in 1768. It consists of three arches, with flagged foot passages, stile ballustrades and ornamental decorations, in a hand-fome light style, admired by every amateur of the arts.

This city has 2 cathedrals, 18 parish churches, 2 chapels of ease, 15 Roman-catholic churches, 6 meeting-houses for presbyterians, 1 for anabaptists, 4 for methodists, 2 for quakers, a church for French Calvinists, a Danish and a Dutch church, and a Jewish synagogue.

Christ-church, or the Holy Trinity, built in 1238 by Donat bishop of Dublin, to whom Sitricus the son of Amlave king of the Ulsters granted the site for that purpose, stands on the summit of the rising ground at the head of Winetavern-street. It is a venerable Gothic pile; and its present appearance evinces its antiquity. St Patrick's cathedral, first built by archbishop Comyn in 1190, and decorated by archbishop Minot in 1370, with a steeple on which a lofty spire was erected in 1750, is also a fine Gothic structure: it stands on the site of Patrick-street; the monuments here are more numerous than in Christ-church; and the steeple is the highest in the city.

St Werburgh's church was originally built in a very early age. In 1301, when a great part of the city was consumed by an accidental fire, this church suffered in the conflagration: it was burnt a second time in 1754, and repaired in its present beautiful form in 1759. The front and steeple are admired for their elegance, lightness, and symmetry: the spire is a fine octagon supported by eight pillars; and a gilt ball terminates the whole, being 160 feet from the ground. Catharine's church first built in 1105, and re-edified in its present form in 1769, is situated on the south side of Thomas's-street. St Thomas's church is the latest foundation of the kind in this city, having been begun in the year 1758, and finished and consecrated in 1762. It is situated on the west side of Marlborough-street, opposite Gloucester-street, to which it forms an elegant termination. The other churches in this city are; on the north side of the river, Mary's, Michan's, and Paul's; on the south side, James's, Luke's, Kevin's, Peter's, Bride's, Nicholas within, Audeon's, Michael's, Mark's, Anne's, John's and Andrew's; this last is called also the Round church, from its form being exactly circular: most, if not all the others were built in an early age; many, however, have been since re-edified, and assumed a more modern form: some of these are not totally devoid of elegance, particularly Anne's. St John's in Fishamble-street was rebuilt in 1773, and has now a hand-fome front of hewn stone, decorated with columns supporting a pediment. Besides these churches, Dublin is adorned with several other public buildings; the most remarkable of which are the following: The castle, the residence of the chief governor, built in 1213 by Henry de Londo- nes, was formerly moated and flanked with towers; but the ditch has been long since filled up, and the old buildings razed, the chapel and wardrobe tower excepted, which still remain: Birmingham tower was rebuilt in 1777, and is now called Harcourt tower. The battle at present confisis of two courts, the principal of which is an oblong square, formed by four ranges of building: within a few years, in the middle of the south range, a hand-fome edifice called Bedford tower has been erected; the front is decorated with a small arcade of three arches, over which is a colonade supporting a pediment, from whence rises an octagon steeple crowned with a small cupula and gilt ball in a light pleasing style. This tower, which fronts the entrance to the viceroys apartments, is connected with the buildings on each side by two fine gates; over that on the right hand is a statue of Fortitude; and over the left gate, which is the grand portal to the upper court, is the statue of Justice. In the lower court are the treasury and other offices, with military stores, an arsenal and armory for 40,000 men, and a barracks in which a captain's detachment of infantry are stationed. Between this barracks and the arsenals is the castle garden; opposite to which, at the rere of the lord Lieu- tenant's apartments, is a range of building called the Garden-front, erected about the year 1740, finished in mountain stone, ornamented by semicolumns of the Ion- ic order, and the windows embellished with cornices and architraves, in a fine taste. The ball-room is now titled St Patrick's Hall. The viceroys body guard consists of a captain, two subalterns, and sixty private pages, with a subaltern's guard of guards. The parlia- ment house, a most superb structure, is situated on the north side of college-green: it was begun in 1729, finished in 15 years, and cost 40,000 l. It is built with Portland stone, and the front formed by a grand por- tico of Ionic columns in the most finifhèd style of ar- chitectural elegance: the internal parts (which have been lately much improved, under the auspices of the present speaker the right honourable John Forster) correspond with its outward magnificence; and the man- ner in which the inside is lighted is universally admired. The house of commons is an octagon, covered with a dome supported by columns of the Ionic order, that rise from an amphitheatrical gallery bal- lustraded with iron scroll-work: this room is admirably well adapted to its purpose. The house of lords is an oblong room, spacious and lofty, and ornamented in a superb manner: it is also judiciously adapted for the reception of the august assembly which meet...
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Dublin. there: among other decorations are two pieces of tapestry, representing the battle of the Boyne and siege of Derry, allowed to have much merit. By order of both houses of parliament, a grand new front has been lately erected on the east side of this magnificent pile; and preparations are making to front the north and west sides in a similar manner, from a design of Mr Gandon's; thus intimated, the whole will form a suit of senatorial apartments matchless in elegance and convenience.

The College founded by queen Elizabeth in 1591, is situated at the east end of College-green. It is a most beautiful structure, consisting of two spacious squares, the first of which contains the refectory, the old hall and chapel, and the new theatre for lectures and examinations; the front of this last building is finely decorated with Corinthian columns supporting a pediment, and over the front of the old hall, on the east side of this square, a handsome staircase rises crowned with a cupola. In the other square, which consists partly of brick buildings for the students, there is a superb library, extending through its whole length on the south side: behind this square there is a fine park. The west side of this square, which is built with Portland stone, forms the grand front, upwards of 300 feet in length, ornamented with Corinthian pillars and other decorations in a very fine taste. At a small distance to the south side of this front is an elegant edifice in which the provost resides. The printing-office is a neat handsome structure on the north side of the park; and opposite to it is the anatomy house, in which are to be seen the celebrated wax models of the human figure, executed at Paris by M. Douane, purchased by the right honourable the earl of Shelburne, and presented to this university. The College of Dublin is an university in itself, consisting of a provost, vice-provost, 7 senior and 15 junior fellows, and 17 scholars of the house; the number of students is generally about 400; it has also professors in divinity, common and civil law, physic, Greek, modern languages, mathematics, oriental tongues, history and oratory, modern history, natural philosophy, anatomy and surgery, chemistry, and botany. His royal highness the duke of Gloucester is chancellor, and his grace the lord primate of Ireland vice-chancellor: the visitors are the chancellor (or, in his absence the vice-chancellor) and the archbishop of Dublin.

The Royal Exchange, situated on Cork-hill, was begun in 1769, and opened for business in 1779; the expense, amounting to L. 40,000, being defrayed by lottery schemes, conducted by the merchants of Dublin with an integrity that did them honour. The building is nearly a square, having three fronts of Portland stone in the Corinthian order, and crowned in the midst with a fine dome, which is supported on the inside by 12 Composite fluted pillars that form a circular walk in the centre of the ambulatory: above these pillars are twelve circular windows, and the ceiling of the dome, which is ornamented with stucco, in the Mosaic style, has also a large window in the middle that illuminates most of the building. Opposite to the north entrance, in the circular walk, is a statue of his present majesty George III. in a Roman military habit; it is executed in bronze by Van Nost, and elevated on a white marble pedestal; in a niche on the stair-case leading to the coffee-room is a white marble statue of the late Dr Charles Lucas, executed by Smyth. The north front which commands a fine view of Parliament-street and Effex-bridge, is embellished by a range of six columns and their correspondent pilasters, supporting a grand pediment with a balustrade on each side: a flight of stone steps leads from the street to the entrance, which is by three fine iron-railled gates: the west front varies but little from the north, except in the want of a pediment, and having only three steps ascending to the entrance, the ground on that side being nearly on a level; this front is opposite the east end of Castle-street near the principal entrance to the Castle.

The Hospital for Lying-in-Women, founded by Dr Bartholomew Mofle, and opened in 1757, stands on the north side of Great Britain street. The building is extremely light and elegant; a beautiful staircase rises in the centre, and the wings are formed, by semicircular colonnades on each side. Adjoining the east colonnade is the Rotunda, where balls and assemblies are held, and concerts performed, for the benefit of the charity: close to it are now erecting the grand suit of apartments before mentioned. The garden at the rear of the hospital is laid out in a good taste.

The Blue-coat Hospital was founded on the west side of Queen-street by Charles II. in 1670, for educating the children of reduced freemen of the city: but the original building being greatly decayed, was taken down, and the new Blue-coat Hospital, situated in Oxmantown-green, was begun in 1773. The front is enriched by four Ionic columns, supporting a pediment in the centre, over which the staircase rises, embellished with Corinthian and Composite columns in an admired taste. Connected with the front by circular walls ornamented with ballustrades and niches, are the school on one side and the church on the other: these form two well proportioned wings; they are of a similar construction, and each is crowned with a small staircase or turret, corresponding with the rest in uniform harmony and beauty.

The Barracks, the foundation of which was laid in 1704, are esteemed the largest and most commodious in Europe. They consist of four squares, situated at the west end of the town, on the north side of the river. The royal square in the centre, with a horfe barrack and the little square on each side, form a spacious and extensive front to the south: the palatine, now called the new square, is opposite to Oxmantown-green; it has been lately rebuilt with hewn stone in a very elegant manner.

The Royal Hospital at Kilmainham for the support of invalids of the Irish army was founded by king Charles II. on a plan similar to that of Chelsea in England. The building was completed in 1683, and cost upwards of L. 23,500. It is situated at the west end of the town on a rising ground near the south side of the river, from whence there is an easy ascent to it through several rows of tall trees. This edifice is of a quadrangular form, including a spacious area handomely laid out in grays-plots and gravel walks: an arcade is carried along the lower storey in each square to the entrance of the hall and chapel, which are both curiously
Dublin, curiously decorated; in the former are several whole-length portraits of royal personages and other distinguished characters.

Dr Stevens's Hospital, the foundation of which was laid in 1720, is a neat quadrangular building, pleasantly situated on the banks of the river near the west end of James's Street, from whence a gravelled walk leads by a gentle descent to the entrance of the hospital, and is continued from thence to the water's edge.

The Linen-hall, at the north end of Linen-hall Street, which was opened at the public expense in 1726 for the reception of linen cloth brought to the Dublin market, is a handsome building, lately enlarged with treble its number of former rooms, which furnish a new proof of commercial prosperity.

The New Prison in Green-street, the first stone of which was laid in 1773, is a large quadrangular structure, designed and executed under the direction of the late Mr Cooley. The east front consists of a centre break of mountain stone ruf ticated and crowned by a pediment, with a plain facade of black limestone on each side; and at the external angles of the building are four round towers.

There are many other public edifices in this city and its environs which merit particular notice. The Hospital for Lunatics in well Bow-lane, founded by Dean Swift, and opened in 1757; the Hibernian School in the Phoenix Park, and the Marine School on Sir John Rogerson's Quay, the first for educating the poor children of soldiers, and the other for bringing up to the service the sons of deceased or disabled seamen; the Hospital for Incurables in south Townsend-street; Mercer's Hospital in Stephen-street; the Meath Hospital on the Coombe; and Simpson's Hospital in Great Britain Street, the last of which was established for the reception of blind and gouty men; are all handsome edifices constructed of hewn stone in the modern style.

To these public buildings may be added St Nicholas's Hospital in Francis-street; the infirmary for sick and wounded soldiers of the army; the Foundling Hospital in James's Street; the Magdalen Asylum in Lecfon-street; and the House of Industry in Channel-row; the halls for corporations (particularly the Weavers Hall on the Coombe, over the entrance of which is a statue of his late majesty George II.); the Thos-fel; the old Four Courts; the old Custom-house; and several others. The Charitable Infirmary, which was first opened in 1728 and rebuilt in 1741, stood on the Inn's Quay, but has lately been pulled down, together with most of the houses on that quay, where the new courts of justice are to be erected; and the benefits of this humane institution are now dispensed to the public at a house taken for that purpose in Jervis-street.

The New Prison, which will be a principal ornament to the metropolis, are from a design of Mr Gandon's; as is also the new Custom-house, now nearly finished on the north wall. This front extends 375 feet, enriched with arcades and columns of the Doric order, crowned with an entablature: the centre has a portico finished with a pediment, in which is a bas-relief of emblematical figures alluding to commerce: over the pediment is an attic story; and a magnificent dome finishes the centre, whereon is a pedestal supporting a statue of Commerce: the key-stones over the entrances and in the centre of the pavilions are decorated with emblematical heads representing the produce of the principal rivers of Ireland; the fouth or front to the river, with the arms of Ireland over each pavilion, is of Portland stone; the whole, being formed with large and striking parts, adds much to the picturesque scene of the river, and will remain a lasting monument of reputation to the several artists employed in this superb building.

The playhouses, considered as public buildings, have nothing to recommend them to notice. One only, viz. the old house, now the theatre-royal, in Smock-alley, is kept open by Mr Daly: who, in consequence of the bill passed last session of parliament for the regulation of the stage, enjoys the exclusive privilege of managing and directing the theatrical exhibitions in this metropolis. The playhouse in Crow-street, which formerly possessed the distinction of theatre-royal, has been shut up these several years past.

But a minute description of every public edifice would occupy more room than this publication admits, not to mention the several private houses, justly admired for their elegance. Among these are:

Leinster-house, the town residence of his grace the Duke of Leinster. The entrance to this princely mansion is from Kildare-street, through a grand gateway of ruf tic stone work, into a spacious court which forms a segment of a circle before the principal front. The interior of this magnificent structure is equal to its exterior appearance; the hall lofty and noble; and the apartments decorated and furnished in a splendid taste, and enriched with several very valuable paintings. The garden front, plain yet bold, possesses a pleasing simplicity; the garden is spacious and elegant, with a beautiful lawn in the centre. The whole of this building is inferior to few private edifices in the British dominions.

The Earl of Charlemont's house is finely situated in the middle of palace-row, on aeminence exactly fronting the centre of the garden at the rear of the Lying-in-Hospital. The front is built with hewn stone brought from Arklow, superior to that of Portland stone. The inside of this house is superb and convenient; the hall ceiling is supported by columns; some of the apartments are decorated with a felect but choice collection of paintings of the best masters; among which are one of Rambrandt's finest pictures, representing Judas repenting and calling the silver pieces on the ground; a portrait of Cæsar Borgia, by Titian; and the Lady's Last Stake by Hogarth, &c. &c. The library is esteemed one of the finest apartments in Dublin, and contains a very valuable collection of the best authors. At one end of it is an anti-chamber, with a fine statue in white marble of the Venus de Medicis by Wilton; and at the other end are two small rooms, one a cabinet of pictures and antiquities, the other of medals: it is situated at the rear of the house, and connected with it by a corrodore, in which are some handsome statues and Egyptian curiosities.

Dublin, which is the seat of government and of the chief courts of justice, has received many charters and ample privileges from the kings of England since the reign of Henry II., who introduced the English laws into this kingdom. Richard II. erected it into a marquisate in favour of Robert de Vere Earl of Oxford, whom he also created Duke of Ireland. It is an
Dublin archiepiscopal see, and returns with the university and the county six members to parliament. The civil government of Dublin is executed by a lord-mayor, recorder, two sheriffs, twenty-four aldermen, and a common council formed of representatives from the twenty-five corporations. Every third year the lord-mayor, in conformity with an old charter, parambulates the bounds of the city and its liberties; and formerly the freemen of the several corporations, armed and mounted on horseback, were accustomed to attend the chief magistrate on this occasion, which was titled riding the franchise: but as this custom was productive of idleness, intoxication, and riots, among the lower orders of the people, it has been of late years very properly laid aside. Besides the silk, woollen, and worsted manufactures carried on in that quarter of the suburbs called the Earl of Meath's Liberty, and which have been considerably improved within these few years, other branches of useful manufacture are establishing in different parts of the metropolis: and though the trade of Dublin has heretofore consisted chiefly in the importation of foreign commodities, yet, now that the restrictions on their woolens and most of their other goods are removed, it is hoped the daily enlargement of their export trade will cause a proportionate increase of national opulence.

Dublin would have had a commodious station for shipping, were it not that the harbour is choked up with two banks of sand, called the North and South Bulls, which prevent vessels of large burden from coming over the bar. This, however, is in some measure remedied by a prodigious work of stone, and piles of wood extending some miles into the bay on the south side, at the end of which there is a lighthouse, beautifully constructed, after a design of the late Mr Smith's. But the port of Dublin is capable of much greater improvement; particularly by turning the course of the river Dodder, building a mole from the north-wall to Ringsend, and clearing the harbour, so as to form a grand basin on the south side for the reception of vessels of all burthen. This work is to be immediately carried into execution, and will, no doubt, meet every possible encouragement, from that spirit for promoting the national welfare which now prevails throughout this kingdom, and is remarkably conspicuous in the capital, where, among others, are the following public institutions.

The board of trustees for promoting the linen and hempen manufactures, established by act of parliament. The Dublin society, incorporated by charter in the year 1740, for improving husbandry and other useful arts. The royal college of physicians, established in the year 1679 for promoting of medical knowledge. The royal college of Surgeons, instituted in the year 1725. The royal Irish academy, for the advancement of science, polite literature, and antiquities, incorporated by letters patent the 28th of January 1786. His majesty is patron, and the chief governor for the time being is visitor. The Hibernian society, for maintaining, educating, and apprenticing, the orphans and children of soldiers in Ireland. The Hibernian marine society, for maintaining, educating, and apprenticing, the orphans and children of decayed seamen in his majesty's navy and the merchants service, also incorporated by royal charter.

But among these public institutions, that of the bank of Ireland must not be omitted: it was established by act of parliament in 1783; and by facilitating the circulation of specie, gives life and vigour to manufactures and commerce. It is conducted under the management of a governor, deputy-governor, and fifteen directors chosen annually from among the subscribers; with this restriction, that five new directors at least must be chosen every year. This bank is kept in Mary's-abbey. There are four other banks in this city under the following firms, viz., Right Honourable David La Touche and Co., and Sir William Gleadowe Newcomen, Bart. and Co. both in Castle-street; John Dawson Coates, Esq.; Thomas-street; and John Finlay and Co. upper Ormond-quay. The houses in which the first three are kept are structures worthy of notice, particularly that of Sir William Gleadowe Newcomen, which has been rebuilt with hewn stone, in a good taste, after a design of the late Mr Ivory's.

To these public institutions may be added the General Post-Office of Ireland, established by act of parliament in 1784, previous to which time the post-office of this kingdom was only considered a branch of the English one. The building erected for this purpose is on the south side of College-green: it is a large extensive structure, and the offices for clerks, &c. are extremely well adapted. There are two post-masters general, a secretary, treasurer, accountant-general, resident surveyor, and comptroller. There is also a penny-post under the direction of the same officers, established for the conveyance of letters to all parts throughout the city and its environs.

Dublin is remarkably well supplied with fleshs, fowls, and fish, the latter in much greater perfection than any other capital in Europe. It is supplied with coals chiefly from Cumberland and Scotland; and water is conveyed to the city on the north side from the river Liffey, by machines curiously constructed for the purpose, at an outlet called Island-bridge: the south side is supplied with that necessary article from a fine reservoir or basin, surrounded with a wall and a handsome gate, and enclosed by a thick hedge and trees planted at equal distances. From one end of it there is a view of the canal for the convenience of inland water carriage, now completed as far as Monastervey, between which and the canal harbour in James's-street, passage-boats ply daily; they are well appointed and accommodated with all necessary refreshments. At a small distance from the basin there is a bridge of a single arch thrown over the canal, the elegance and architecture of which are much admired: the tides of the canal for some miles into the country are planted with elm-trees, which renders its banks in fair weather a delightful place of exercise for the citizens; who also resort for recreation to his majesty's Phoenix-park, a fine extensive enclosure at the west end of the town, and on the opposite side of the river to the canal, diversified with woodland, campaign, and rolling ground, and well stocked with deer. It is seven miles in circuit; and besides the Hibernian school, is adorned with the viceroy's beautiful villa and some handsome lodges belonging to the rangers: in this park are also a magazine for powder and a battery that commands the city. In 1747, a fluted pillar 30 feet high, with a phoenix on the top, was erected in the centre
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Dublin.


centre of a ring in this park by the celebrated earl of Chesterfield when lord lieutenant of Ireland.

The circular road which surrounds the city, beginning on one side of the river, at the east end of the town, and terminating on the opposite shore, is carried through the park. This road forms a very agreeable ride, and is much frequented. It is the boundary of the jurisdiction of the new police, instituted for the better preservation of the peace and good order of the city and the personal security of its inhabitants. This institution, lately established by act of parliament, is under the direction of a chief commissioneer, three assistant commissioneers, and four divisional justices, who are all aldermen of the city: which is therefore properly termed the district of the metropolis, and divided into four wards. The police-guard consists of 40 horsemen and 400 foot, well armed, and in regular uniform: they are taught military discipline, and stationed at night-time in the several watch-houses; from whence parties are constantly patrolling the streets, and sentinels are placed at different stands. This institution is found by experience to be a much more effectual prevention of robberies, riots, and nocturnal outrages, than the parish watches; and to this security which the well disposed working manufacturers enjoy, may in a great measure be attributed that encouraging spirit of industry and peaceable behaviour now so prevalent among this useful class of the community, which cannot fail to be productive of the most salutary consequences to the future welfare of the metropolis and the kingdom in general.

DUBOS (John Baptiste), a learned and ingenious French author, born at Beauvais in 1670. He finished his studies at Paris, and at length was intrusted with the management of several important affairs in Italy, England, and Holland. At his return to Paris, he had a prebendary given him; afterwards he had a pension of two thousand livres, and the abbey of Notre Dame at Reuilly, near Beauvais. He died at Paris, when perpetual secretary of the French academy, on the 30th of March 1742. His principal works are, 1. Critical Reflections on Poetry and Painting, in three volumes duodecimo. 2. A Critical History of the French Monarchy in Gaul, two volumes 40o.

DUBRIS (anc. geog.), a town of Britain; now Dover, from the Duonain of the lower age. A port town of Kent, opposite to Calais.

DUCA, in general, something belonging to a duke. See Duke.

The letters patent granted by the senate of Venice are called ducats: so also are the letters wrote, in the name of the senate, to foreign princes. The denomination of ducat is derived hence, that at the beginning of such patents, the name of the duke or doge is wrote in capitals, thus, N—DI Gratia Dux Venetiarum, &c. The date of ducats is usually in Latin, but the body is in Italian. A courier was dispatched with a ducat to the emperor, returning him thanks for renewing the treaty of alliance (in 1716), against the Turks, with the republic of Venice.

DUCAS, a learned Greek, who wrote an history of what passed under the last emperors of Constantinople, till the ruin of that city. This work, which is esteemed, was printed at the Louvre in 1649, with the Latin translation and notes of Boullant.

DUCAT, a foreign coin, either of gold or silver, struck in the dominions of a duke: being about the same value with a Spanish piece of eight, or a French crown, or four shillings and sixpence fterling when of silver; and twice as much when of gold. See Coin.

The origin of ducats is referred to one Longinus, governor of Italy; who, revolting against the emperor Justin the Younger, made himself duke of Ravenna, and called himself Exarcha, i.e. without lord or ruler; and, to show his independence, struck pieces of money of very pure gold in his own name, and with his own stamp, which were called ducats, ducats; as Procopius relates the story.

After him, the first who struck ducats were the Venetians, who called them Zeccotti or aquinis, from Zecca, the place where they first were struck. This was about the year 1280, in the time of John Dandoli: but we have pretty good evidence, that Roger king of Sicily had coined ducats as early as 1240. And Du Cange scruples not to affirm, that the first ducats were struck in the duky of Apulia in Calabria. The chief gold ducats now current are, the single and double ducats of Venice, Florence, Genoa, Germany, Hungary, Poland, Sweden, Denmark, Flanders, Holland, and Zurich. The heaviest of them weighs 5 pennyweights 17 grains, and the lightest 5 pennyweights 10 grains; which is to be understood of the double ducats, and of the sige in proportion.

The Spaniards have no ducats of gold; but, in lieu thereof, they make use of the silver one; which, with them, is no real species, but only a money of account like our pound. It is equivalent to 11 rials. See Rial. The silver ducats of Florence serve there for crowns.

DUCAUOON, a silver coin, struck chiefly in Italy; particularly at Milan, Venice, Florence, Genoa, Lucca, Mantua, and Parma: though there are also Dutch and Flemish ducatoons. They are all nearly on the same footing; and being a little both finer and heavier than the piece of eight, are valued at two pence or three pence more, viz. at about four shillings and eight pence fterling.

There is also a gold ducatoon, struck and current chiefly in Holland: it is equivalent to twenty florins, on the footing of one shilling and eleven pence halfpenny the florin.

DUCENARIUS, in antiquity, an officer in the Roman army, who had the command of 2000 men. The emperors had also ducenarii among their procurators or intendants, called procuratores ducenarii. Some say, that these were such whose salary was two hundred festerces; as in the games of the circus, horse's hired for two hundred festerces were called ducenarii. Others hold, that ducenarii were those who levied the two hundred penny, the officers appointed to inspect the raising of that tribute. In the inscription at Palmira, the word ducenarius, in Greek DUCENAROS, occurs very often.

DUCENTESIMA, in antiquity, a tax of the two hundredth penny, exacted by the Romans.

DUCHAL (James), D. D. a late pious and learned dissenting minister, was born in Ireland, and finished his studies at the university of Glasgow; which afterwards, from a regard to his merit, conferred on him the degree of doctor of divinity. He resided 10 or 11 years at Cambridge, as the pastor of a small congregation there; where he enjoyed his beloved retirement,
DUCKY, in geography. An appellation given to the dominions of a duke.

Duchy Court, a court in England wherein all matters belonging to the duchy or county palatine of Lancaster are decided by decree of the chancellor of that court.

The origin of this court was in Henry the IV.'s time, who obtained the crown by deposition of Richard II. and having the duchy of Lancaster, by descent, in sight of his mother, became sealed thereof as king, not as duke: So that all the liberties, franchises, and jurisdictionals of the said county paffed from the king, by his great seal, and not by livery or attornment, as the earldom of March, and other possessions, which descended to him by other ancestors than the king's did. Henry IV. by authority of parliament, fevered the possessions, liberties, &c. of the said duky from the crown; but Edward IV. restored them to their former nature.

The officers belonging to this court are, a chancellor, attorney-general, receiver-general, clerk of the court, and messenger; beside the assistants, as an attorney in the exchequer, another in chancery, and four councillors.

DUCK, in ornithology. See Anas and Decoy.

This fowl is furnished with a peculiar structure of vesicles about the heart, which enables it to live a considerable time under water, as is necessary for it in diving. This made Mr. Boyle think it a more proper subject for experiments with the air-pump than any other bird. A full grown duck being put into the receiver of an air-pump, of which she filled one third part, and the air exhausted, the creature seemed to bear it better for the first moments than a hen or other fowl; but, after about a minute, she showed great signs of uneasiness, and in less than two minutes her head fell down, and she appeared dying, till revived by the letting in of the air. Thus, whatever facility of diving this and other water-fowl may have, it does not appear that they can subsist, without air for respiration, any longer than other animals. A young callow duck was afterwards tried in the same manner, and with the same success, being reduced very near death in less than two minutes. But it is observable, that both birds swelled very much on pumping out the air, so that they appeared greatly larger to the spectators, especially about the crop; it not being intended that any water-fowl should live in an exceedingly rarefied air, but only be able to continue occasionally some time under water. Nature, though she has provided them with the means of this, has done nothing for them in regard to the other.

The strongest influence of these creatures being calculated to live almost in any situation, we have in the accounts of the blind ducks in the Zirchnitzer lake in Carniola. It is supposed that this lake communicates with another lake under ground in the mountain Sauronic, and fills or empties itself according to the fullness or emptiness of that lake; the water of the upper lake running off, and that in vault quantities, by holes in the bottom. The ducks, which are here always in great numbers, are often carried down along with the water, and forced into the subterraneous lake to which it retires. In this unnatural habitation, many of these creatures undoubtedly perish, but some remain alive. These become blind, and lose all their feathers; and in the next filling of the lake, both they and vault numbers of fish are thrown up with the water. At this time they are fat, but make a strange appearance in their naked state, and are easily caught, by reason of their want of fight. In about a fortnight they recover their sight and feathers; and are then of the size of a common wild-duck, but of a black colour, with a white spot in their forehead. When opened, on being taken at their first coming up in their blind state, their stomachs are found full of small fishes, and somewhat resembling weeds. From this it seems, that they cannot be absolutely blind; but that the degree of light to which they have been accustomed in their subterraneous habitation, was sufficient to enable them to procure food for themselves; and their blind, on coming again into open day-light, is no other than that of a maff who has been long in the dark, on having in an instant a large blaze of candles set under his eyes.

DUCKING, a mode of water, a diversion anciently practised among the Goths by way of sacrifice; but among the Celts, Franks, and ancient Germans, it was a fort of punishment for perfons of scandalous lives. At Marseilles and Bourbon their men and women of scandalous life are condemned to the cale, as they call it; that is, to be shut up naked to the height in an iron cage fastened to the yard of a gallows, and dunked several times in the river. The fame is done at Toulouse to blaspheomers.

Ducking, a fort of marine punishment, inflicted by the French, on those who have been convicted of defecution, blasphemy, or exciting sedition. It is performed as follows: The criminal is placed afloat of a short thick hatt, fastened to the end of a rope, which passes through a block hanging at one of the yard-arms. Thus fixed, he is hoisted suddenly up to the yard, and the rope being slackened at once, he is plunged into the sea. This shaftment is repeated several times conformable to the purport of the sentence pronounced against the culprit, who has at that time several cannon-shot fired to his feet during the punishment;

which:
which is rendered public by the firing of a gun, to advertise the other ships of the fleet thereof, that their crews may become spectators.

Ducking is also a penalty which veteran sailors pretend to inflict on those who, for the first time, pass the tropic of Cancer, the equator, or the straits of Gibraltar, in consequence of their refusal or incapacity to pay the usual fine levied on that occasion.

Ducking-Steel. See Castigatory.

Duckup, at sea, is a term used by the steer's man, when the main-fail, fore-fail, or sprit-fail, hinders his seeing to steer by a land-mark: upon which he calls out, Duckupp the clew-lines of these fails; that is, hale the fails out of the way. Also when a shot is made by a chase-piece, if the clew of the sprit-fail hinders the sight, they call out, Duckupp, &c.

Duct, in general, denotes any tube or canal. It is a term much used by anatomists.

DUCTILITY, in physics, a property possessed by certain solid bodies, which consists in their yielding to percussion or pressure, and in receiving different forms without breaking.

Some bodies are ductile both when they are hot and when they are cold, and in all circumstances. Such are metals, particularly gold and silver. Other bodies are ductile only when heated to a sufficient degree; such as wax and other substances of that kind, and glas. Other bodies, particularly some kinds of iron, called by the workmen red short, brats, and some other metallic mixtures, are ductile only when cold, and brittle when hot. The degrees of heat requisite to produce ductility in bodies of the first kind, vary according to their different natures. In general, the heat of the body must be such as is sufficient to reduce it to a middle state between solidity and perfect fusion.

As wax, for instance, is fusible with a very small heat, it may be rendered ductile by a still smaller one; and glas, which requires a moat violent heat for its perfect fusion, cannot acquire its greatest ductility until it is made perfectly red-hot, and almost ready to fuse. Lately, some bodies are made ductile by the abstraction of a fluid. Such are certain earths, particularly clay. When these earths have absorbed a sufficient quantity of water to bring them to a middle state between solidity and fluidity, that is to the condition of a considerably firm paste, they have then acquired their greatest ductility. Water has preciously the same effect upon them in this respect that fire has upon the bodies abovementioned.

Dudley (Edmund), an eminent lawyer and able statesman in the reign of Henry VII.; who with Sir Richard Empson, another lawyer of the same complexion, infufed in filling that rapacious monarch's coffers by arbitrary prosecutions of the people on old penal statutes. They were beheaded on the accession of Henry VIII. to pacify the clamours of the people for justice.

Dudley (John), duke of Northumberland, son of the above, a statesman; memorable in the English history for his unsuccessful attempt to place the crown on the head of his daughter-in-law, lady Jane Gray, who fell a victim to his ambition; was born in 1502, and beheaded in 1553. See (History of) England. Ambroso his eldest son was a brave general and able statesman under queen Elizabeth; and received the appellation of the good earl of Warwick. Henry, the duke's second son, was killed at the siege of St Quintin. Robert, the third son, a man of bad character, was created earl of Leicester; and was one of queen Elizabeth's favourites. His fourth son was the unfortunate lord Guildford Dudley, whose only crime was being the husband of lady Jane Grey, for which he was beheaded in 1554.

Dudley (Sir Robert), as he was called in England, and, as he was styled abroad, earl of Warwick and duke of Northumberland, was the son of Robert abovementioned, by the lady Douglas Sheffield; and was born at Sheen in Surry in 1573, where he was carefully concealed, to prevent the queen's knowledge of the earl's engagement with his mother. He studied at Oxford; when his father dying, left him the bulk of his estate. He was at this time one of the finest gentlemen in England; and having a particular turn to navigation, fitted out a small squadron at his own expense, with which he sailed to the river Ornonoque, and took and destroyed nine sail of Spanish ships. In 1595, he attended the earl of Essex, and the lord high admiral of England, in their expedition against the Spaniards; when, for his gallant behaviour at the taking of Cadiz, he received the honour of knighthood. He now endeavoured to prove the legitimacy of his birth, in order to be entitled to his hereditary honours. But being overpowered by the interest of the countess dowager of Leicester, he applied for a licence to travel; and being well received at the court of Florence, resolved to continue there, notwithstanding his receiving a letter of recall; on which his whole estate was seised by king James I. and vested in the crown.

He discovered at the court of Cosimo II. great duke of Tuscany, those great abilities for which he had been admired in England, and was at length made chamberlain to his serene highness's confort. He there contrived several methods of improving shipping; introduced new manufactures; and by other services obtained so high a reputation, that at the desire of the archduchess, the emperor Ferdinand, in 1620, created him a duke of the holy Roman empire. He afterwards drained a vast tract of marshes, between Pisa and the sea; and raised Leghorn, which was then a mean, pitiful place, into a large and beautiful town, improving the haven by a mole, which rendered it both safe and commodious; and having engaged his highness to declare it a free port, he, by his influence and correspondence, drew many English merchants to settle and set up houses there, which was of very great service to his native country, as well as to the Spaniards. He was also the patron of learned men, and held a high place himself in the republic of letters. His most celebrated work is his Del Arteo del Mare, in two volumes, folio.

Duel, a single combat, at a time and place appointed, in consequence of a challenge. This custom came originally from the northern nations, among whom it was usual to decide all their controversies by arms. Both the accuser and accused gave pledges to the judges on their respective behalf; and the custom prevailed so far amongst the Germans, Danes, and Franks, that none were excused from it but women, sick people, cripples, and such as were under 21 years of age or above 60. Even ecclesiastics, priests, and monks, were
The punishment of the vanquished was either death, by hanging or beheading; or, mutilation of members, according to the circumstances of the case. Duels were at first admitted not only on criminal occasions, but on some civil ones for the maintenance of rights to estates, and the like: in latter times, however, before they were entirely abolished, they were restrained to these four cases. 1. That the crime should be capital. 2. That it should be certain the crime was perpetrated. 3. The accused must by common fame be supposed guilty. And, 4. The matter not capable of proof by witnesses.

DUEL, at present, is used for single combat on some private quarrel; and must be premeditated, otherwise it is called a rencounter. If a person is killed in a duel, both the principals and seconds are guilty, whether the seconds engage or not. (See the article Murder.) It is also a very high offence to challenge a person either by word or letter, or to be the messenger of a challenge. (See Law, no cxlxxx. 20.)

The general practice of duelling, in this last sense, took its rise in the year 1527, at the breaking up of a treaty between the emperor Charles V. and Francis I. The former desired Francis's herald to acquaint his sovereign, that he would henceforth consider him not only as the safe violator of public faith, but as a stranger to the honor and integrity becoming a gentleman. Francis, too high-spirited to bear such an imputation, had recourse to an uncommon expedient to vindicate his character. He instantly sent back the herald with a cartel of defiance, and set the time and place of the encounter, and the weapons with which he chose to fight. Charles, as he was not inferior to his rival in spirit or bravery, readily accepted the challenge; but after several messages concerning the arrangement of all the circumstances relative to the combat, accompanied with mutual reproaches bordering on the most indecent ferocity, all thoughts of this duel, more becoming heroes of former ages than the two greatest monarchs of their age, were entirely laid aside.

The example of two personages so illustrious, drew such general attention, and carried with it so much authority, that it had considerable influence in introducing an important change in manners all over Europe. Duels, as has already been observed, had been long permitted by the laws of all the European nations; and, forming a part of their jurisprudence, were authorized by the magistrate on many occasions, as the most proper method of terminating questions with regard to property, or of deciding in those which regarded crimes. But single combats being considered solemn appeals to the omnipotence and justice of the Supreme Being, they were allowed only in public causes, according to the prescription of law, and carried on in a judicial form. Men, accustomed to this manner of decision in courts of justice, were naturally led to apply it to personal and private quarrels. Duels, which at first could be appointed by the civil judge alone, were fought without the interposition of his authority, and in cases to which the laws did not extend. The transition between Charles and Francis strongly countenanced this practice. Upon every affront or injury which seemed to touch his honor, a gentleman thought himself intitled to draw his sword, and to call on his adversary to make reparation. Such an opinion, introduced among men of fierce courage, of high spirit, and of rude manners, where offence was often given, and revenge was always prompt, produced most fatal consequences. Much of the best blood in Christendom was shed; many useful lives were lost; and, at some periods, war itself hath hardly been more destructive than these contests of honour. So powerful, however, is the dominion of fashion, that neither the terror of penal laws, nor reverence for religion, have been able entirely to abolish a practice unknown among the ancients, and not justifiable by any principle of reason; though at the same time we must ascribe, in some degree, the extraordinary gentry and complaisance of modern manners, and that respectful attention of one man to another, which at present render the social intercourses of life far more agreeable and decent than among the most civilized nations of antiquity.

Public opinion is not easily controlled by civil institutions; for which reason it may be questioned whether any regulations can be contrived of sufficient force to suppress or change the rule of honour which dignifies all scruples about duelling with the reproach of cowardice.

The inadvisable redress which the law of the land affords for those injuries which chiefly affect a man in his sensibility and reputation, tempts many to redress themselves. Prosecutions for such offences, by the trifling damages that are recovered, serve only to make the sufferer more ridiculous.—This ought to be remedied.

For the army, where the point of honour is cultivated with exquisite attention and refinement, there might be established a court of honour, with a power of awarding those sublimities and acknowledgments which it is generally the object of a challenge to obtain; and it might grow into a fashion with persons of rank of all professions to refer their quarrels to the same tribunal.

Duelling, as the law now stands, can seldom be overtaken by legal punishment. The challenge, appointment, and other previous circumstances, which indicate the intention with which the combatants met, being suppressed, nothing appears to a court of justice but the actual rencounter; and if a person be slain when actually fighting with his adversary, the law deems his death nothing more than manslaughter.

DUERO, or Duero, a large river, which, rising in Old Castile in Spain, runs from east to west, crosses the province of Leon, and after dividing Portugal from Spain by a southerly course, turns westward, crosses Portugal, and falls into the Atlantic Ocean at Porto.

DUGDALE (Sir William), an eminent English historian, antiquarian, and herald, born in Warwickshire in 1605. He was introduced into the herald's office by Sir Christopher Hatton; and ascended gradually through all the degrees, until he became greater principal king at arms. His chief work is the Monument Anglicanum, in three vols folio; containing the charters and descriptions of all the English monasteries, adorned with engravings; in the former part of which,
work he was assisted by Mr Roger Dodsworth. Nor are his Antiquities of Warwickshire less esteemed. He wrote likewise, among other things of less note, the History of St Paul's Cathedral; a History of Embanking and Draining; a Barouge of England; and completed the second volume of Sir Henry Spelman's Council, with a second part of his Glossary. He died in 1656. His son, Sir John, was Norroy king at arms, and published a Catalogue of English Nobility. His daughter Elizabeth married the famous Elias Ashmole.

Duillia lex, was enacted by M. Duillius, a tribune, in the year of Rome 304. It made it a capital crime to leave the Roman people without its tribunes, or to create any new magistrate without a sufficient cause. Another in 392, to regulate what interest ought to be paid for money lent.

C. Duillius Nepos, a Roman consul, the first who obtained a victory over the naval power of Carthage in the year of Rome 492. He took fifty of the enemy's ships, and was honoured with a naval triumph, the first that ever appeared at Rome. The Senate rewarded his valor by permitting him to have medals struck in commemoration of this victory; and there exists a column at Rome which was erected on the occasion.

Duke, Dux, a sovereign prince, without the title or quality of king. Such are the dukes of Lorrain, of Holstein, Savoy, of Parma, &c. The word is borrowed from the modern Greeks, who call douetis what the Latins call dux.

There are also two sovereigns who bear the title of grand-dux; as the grand-duke of Tuscany, and the grand-duke of Muevoy, now called the czar or emperor of Russia. The title of grand-dux belongs to the apparent heir of Russia; and the title of arch-duke is given to all the sons of the house of Austria, as that of arch-duches to all the daughters.

Duke, Dux, is also a title of honour or nobility, the next below princes. The dukedom or dignity of duke is a Roman dignity, a duces, "leading" or "commanding." Accordingly, the first dukes, duces, were the duxes exercitus, "commanders of armies." Under the later emperors, the governors of provinces in war-time were intitled duces. In after times the same denomination was also given to the governors of provinces in time of peace. The first governor under the name of duke was a duke of the Marchia Rhaetica, or Grifons, whereof mention is made in Caffiodorus; and there were afterwards thirteen dukes in the eastern empire, and twelve in the western. The Goths and Vandals, upon their over-running the provinces of the western empire, abolished the Roman dignities wherever they settled. But the Franks, &c., to please the Gauls who had been used to that form of government, made it a point of politics not to change any thing therein: and accordingly they divided all Gaul into duchies and counties; and gave the names sometimes of dukes, and sometimes of counts, to the governors thereof.

In England, during the Saxon time, Camden observes, the officers and commanders of armies were called dukes, duces, after the ancient Roman manner, without any addition. After the Conquest some in, the title lay dormant till the reign of Edward III., who created his son Edward, first called the Black Prince, duke of Cornwall; which hath ever since been the peculiar inheritance of the king's eldest son during the life of his father; so that he is dux naturi, non creatus. After whom there were more made, in such manner as that their titles descended to their posterity. They were created with much solemnity, per culturas gladium, capaques, &c. circuli aurum in capite impotitionem. However, in the reign of Queen Elizabeth, A. D. 1572, the whole order became utterly extinct; but it was revived about 30 years afterwards by her successor, in the person of George Villiers duke of Buckingham.

Though the French retained the names and form of the ducal government, yet under their second race of kings there were scarce any such thing as dukes: but all the great lords were called counts, peers, or barons; excepting, however, the dukes of Burgundy and Aquitaine; and the duke of France, which was a dignity Hugh Capet himself held, corresponding to the modern dignity of a count de palais, or the king's lieutenant. By the weaknesses of the kings, the dukes or governors sometimes made themselves sovereigns of the provinces entrusted to their administration. This change happened chiefly about the time of Hugh Capet; when the great lords began to dismember the kingdom, so that that prince found more competitors among them than subjects. It was even with a great deal of difficulty they could be brought to own him their superior, or to hold of him by faith and homage. By degrees, what with force, and what by marriages, these provinces, both duchies and counties, which had been rent from the crown, were again united to it. But the title duke was no longer given to the governors of provinces.

From that time duke became a mere title of dignity, annexed to a person and his heirs male, without giving him any domain, territory, or jurisdiction over the place whereof he was duke. All the advantages thereof now conlin in the name, and the precedence it gives.

The dukes of our days retain nothing of their ancient splendor but the coronet on their escutcheon, which is the only mark of their departed sovereignty. They are created by patent, sine, and are quartered, mantled, and crowned; capite aurei, in the heralds language, "leading," or "commanding." Accordingly, the first dukes, duces, were the duxes exercitus, "commanders of armies." Under the later emperors, the governors of provinces in war-time were intitled duces. In after times the same denomination was also given to the governors of provinces in time of peace. The first governor under the name of duke was a duke of the Marchia Rhaetica, or Grifons, whereof mention is made in Caffiodorus; and there were afterwards thirteen dukes in the eastern empire, and twelve in the western. The Goths and Vandals, upon their over-running the provinces of the western empire, abolished the Roman dignities wherever they settled. But the Franks, &c., to please the Gauls who had been used to that form of government, made it a point of politics not to change any thing therein: and accordingly they divided all Gaul into duchies and counties; and gave the names sometimes of dukes, and sometimes of counts, to the governors thereof.

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DULCIFYING, in chemistry, is the sweetening any matter impregnated with salts, by frequently washing it in pure water.

DULL, in the manege. The marks of a dull horse, called by the French marquis de laire, are white spots round the eye and on the tip of the nose, upon any general colour whatsoever. Though the vulgar take these spots for signs of stupidity, it is certain they are great marks of the goodnefs of a horse; and the horses that have them are very feutable and quick upon the spur.

DULCART (Heiman), a Dutch painter and poet. He was a pupil to Rembrandt, for whose works the few he left are often mistaken. He died in 1684.

DUMBARTON. See DUMBARTON.

DUMNESS, the privation of the faculty of speech. The most general, or rather the sole caufe of dumnefs, is the want of the fenfe of hearing. The use of language is originally acquired by imitating articulate sounds. From this fource of intelligence, deaf people are entirely excluded: they cannot acquire articulate sounds by the ear: unless, therefore, articulation be communicated to them by some other medium, these unhappy people must for ever be deprived of the use of language; and as language is the principal fource of knowledge, whoever has the misfortune to want the fenfe of hearing, muf: remain in a flate little superior to that of the brute creation. Deafnefs has in all ages been confidered as such a total obftruction to speech or written language, that an attempt to teach the deaf to speak or read has been uniformly regarded as impracticable, till Dr Wallis and some others have of late fhewn, that although deaf people cannot learn to speak or read by the direc:ion of the ear, there are other fources of imitation, by which the fame effect may be produced. The organs of hearing and of speech have little or no connection. Perforions deprived of the former generally poifles the latter in fuch perfection, that nothing further is necessary, in order to make them articulate, than to teach them how to use these organs. This indeed is no eafy task; but experience shews that it is practicable. Mr Thomas Braidwood, late of Edinburgh, was perhaps the first who ever brought this surprifing art to any degree of perfection. He began with a fingle pupil in 1704; and fince that period has taught great numbers of people born deaf to speak diftinctly; to read, to write, to understand figures, the principles of religion and morality, &c. At the time we first converted with him, being a few years after the commencement of his practice, he had a confiderable number of deaf pupils, some of them above 20 years of age, all making a rapid and amazing progress in those useful branches of education.

Mr Braidwood's principal difficulty, after he had discovered this art was to make people believe in the practicability of it. He advertised in the public papers; he exhibited his pupils to many noblemen and gentlemen; still he found the generality of mankind unwilling to believe him. A remarkable instance of this incredulity occurred five years ago. A gentleman in England lent a deaf girl of his to Mr Braidwood's care. A year or two afterwards, Mr Braidwood wrote to the father, that his daughter could speak, read, and write distinctly. The father returned an answer, begging Mr Braidwood's excuse, as he could not believe it; however, he defired a friend of his, who was occasionally going to Edinburgh, to call at Mr Braidwood, and inquire into the truth of what he had written; he did so; conversed with Mr Braidwood, faw the young lady, heard her read, speak, and answer any questions he put to her. On his return, he told the father the surprising progress his child had made; but still the father thought the whole an imposition: the girl herself wrote to her father, but he looked upon the letter as a forgery. About this time the father died; and the mother lent an uncle and cousin of the deaf lady's from Shrewbury, in order to be satisfied of the truth. When they arrived, Mr Braidwood told the girl her uncle and cousin were in the parlour, and defired her to go and ask them how they did, and how her mother and other friends did. The friends were astonished, and could hardly credit their own ears and eyes.

When we conversed with Mr Braidwood concerning the nature and method of teaching this wonderful art, he seemed to be very defirous of communicating and transmitting his discovery to posterity; but observed, from the nature of the thing we believe it to be true, that he could not communicate it fully in writing as to enable any other person to teach it. The first thing in the method is, to teach the pupil to pronounce the simple sounds of the vowels and confronants. We have even seen him performing this operation; but are unable to give a clear idea of it. He pronounces the found of a slowly, pointing out the figure of the letter at the same time; makes his pupil observe the motion of his mouth and throat; he then puts his finger into the pupil's mouth, depresses or elevates the tongue, and makes him keep the parts in that position; then he lays hold of the oufide of the windpipe; and gives it some kind of squeeze, which it is impossible to describe: all the while he is pronouncing a, the pupil is anxiously imitation him, but at first seems not to understand what he would have him to do. In this manner he proceeds, till the pupil has learned to pronounce the sounds of the letters. He goes on in the fame manner to join a vowel and a confronant, till at length the pupil is enabled both to speak and read.

That his pupils were taught not only the mere pronunciation, but alfo to understand the meaning of what they read, was eafily ascertained by a conversation with any of them. Of this Mr Pennant gives a remarkable instance in a young lady of about 13 years of age, who had been sometime under the care of Mr Braidwood. She readily apprehended (says he) all I faid, and returned me anwers with the utmost facility. She read; she wrote well. Her reading was not by rote. She could clothe the fame thoughts in a new fet of words.
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DUM

Dumbness, and never vary from the original sense. I have for-
got the book he took up, or the sentences he made a
new version of: but the effect was as follows:

"Original passage. Lord Bacon has divided the
whole of human knowledge into history, poetry, and
philosophy; which are referred to the three powers of
the mind, memory, imagination, and reason.

"Version. A nobleman has parted the total or all
of man's study or understanding into, An account of
the life, manners, religion or country; verse or metre; moral or natural knowledge; which are pointed to the three faculties of the soul or would be referred to the three powers of the ideas and the articulate sounds, by which they are excited in the mind, and is not less arbitrary than that between these ideas and the written characters which are made to represent them to the eye. M. Linguet complied with the invitation; and the Abbé having
ordered him to fix upon some abstract term which he
would by signs communicate to his pupils, he chose
the word unintelligibility; which, to his astonishment, was almost instantly written by one of them. The
Abbé informed him, that to communicate this word
he had used five signs, which, though scarcely perceivable to him, were immediately and distinctly
apprehended by his scholars: the first of these signs
indicated an internal action; the second represented
the act of a mind that reads internally, or, in other words, comprehends what is proposed to it; a third signified that such a disposition is possible; these, taken togeth
weight, form the word intelligible; a fourth sign trans
forms the adjective into the substantive; and a fifth,
expressing negation, completes the word required. M.
Linguet afterwards proposed the question, What do
you understand by metaphysical ideas? which being com
mitted to writing, a young lady immediately answered.

periodical DUMness. In the Ephemerides of the
Curious, we have an account of a periodical dumbness,
which had continued for more than 15 years, and had
not gone off at the time the account was wrote. The
person was son to an inn-keeper at Jefing in the duchy
of Wirtemberg in Germany. He was one night taken
sick after supper, that he could neither stand nor sit.
He continued for about an hour, oppressed with sick
ness to such a degree as to be in danger of suffocation.
At the expiration of this time he grew better; but du
ring three months, he was much dejected, melancholy,
and, at times, fearful. He was then suddenly
trucked dumb, and became unable to pronounce the least
word, or form the least sound, though he could speak
very articulately before. The loss of speech was ar
sirf instantaneous, and continued only a few minutes; but the duration of it began to lengthen every day; so
that it soon amounted to half an hour, two hours, three
hours, and at last to 3 hours, yet without any order.
At last the return of speech kept so constant and regular
an order, that for 14 years together, he could not
speak except from noon, during the space of one entire
hour, to the precise moment of one o'clock. Every
time he lost his speech, he felt something rise from his
stomach to his throat. Excepting this loss of speech,
he was afflicted with no other disorder of any animal
function. Both his internal and external senses con tinued
found: he heard always perfectly well, and an
swered the questions proposed to him by gestures or
writing.
writing. All suspicion of deceit was removed by his
keeping exactly the same hour, though he had no acc
cess to any instruments by which time can be measured.

DUMFRIESLINE, a parliament-town of Scotland,
situated in the county of Fife, 15 miles north-west of
Edinburgh; W. Long. 3. 20. N. Lat. 56. 15. Here
was formerly a magnificent abbey and palace of
the kings of Scotland, in which the princess Elizabeth,
daughter of king James VI. and mother of the
princess Sophia, from whom the present royal family are
defended, was born. In the inn of this town is the
marriage bed of James VI. and his queen; it is still
entire, and used by strangers who lodge here. This
place is noted for a manufacture of figured linen cloth
called diaper. The town gave title of earl to a baro
net of the Seton family, which was forfeited in the year
1690.

DUMFRIES, a county in the south of Scotland,
comprehending the hitherto Nithdale, and strewtar
y of Annandale, and the lordship of Eildale, extends in
length from north-west to south-east about 60 miles,
and is about 30 miles in breadth where broadest. It
is bounded on the south-west by Galloway and part of
Kyle; on the north-east by the counties of Roxburgh,
Selkirk, and Peebles; on the north-west by Clyde-
dale; and on the south east by Solway Firth and the
marches between Scotland and England. A great
part of the country is mountainous and overgrown
with heath, well stocked with game of all kinds; but the
valleys, through which the Eild, the Annan, the Nith,
and other smaller rivers run, are extremely pleasant;
and some of them well cultivated and very fertile, and
produce oats, barley and wheat in abundance, both
for maintaining the inhabitants and for exportation;
while the mountainous parts afford pasture for innum
erable flocks of sheep and herds of black cattle, many
thousands of which are annually exported to England.
In the valleys are several natural woods and some ex
tensive plantations of different kinds of timber. In
the division called Nithdale, are the rich lead mines
of Wanlockhead, the coal mines of Sanquhar and Cairn-
burn, the inexhaustible lime-quarries of Closeburn and
Barjarg, and free flane in almost every parish. Annan-
dale has the rich lime-quarries of Kellhead and Com-
tongan, with plenty of free flane near the towns of An-
nan and Lochmaben; and in the lower part of Eld-
dale are limed stone and coal in abundance.

DUMFRIES, the capital of the abovementioned
county, a handomé town, situated on a ridge or rising
ground on the north-east side of the river Nith, about
10 miles above where it falls into Solway Frith, in N.
Lat. 55. 8. 30. Long. W. of Greenwich Observatory,
3. 56. Its ancient name, it is said by some of the
Scottish historians, was Catoia; but on what authority
we cannot tell. Its present name appears to have been
derived partly from its situation, and partly from the
monastery of Grey Friars that formerly stood near the
head of the street called the Friar-owenall, the kitchen
of which is all that now remains; being only a corrup
tion of Drumfris, or "the eminence of the friary:" and
accordingly, till within these 40 or 50 years, it was
always spelt Drumfris, and not Dumfries, as it is
now for the sake of greater similitude. Besides the pla
ces of its situation on the side of a beautiful wind
ning river, it is surrounded on all sides with one of the
finest and best cultivated sheets of dale country that
one can any where meet with, and the prospect from it
terminates at the distance of a few miles, by a conti
nued chain of hills, forming altogether one of the
grandest natural amphitheatres perhaps in Britain.
There was anciently a strong castle at the south end of
the town belonging to the Cumings, lords of Baden
noch, of which there are now no remains. Another
castle was afterwards built at the north-west end, which
was taken down about 70 years ago. On the north-
est side of it, at some little distance, are the ruins of a
chapel built by K. Robert Bruce, and endowed for
a number of priests to say masses for the repose of the
soul of Sir Christopher Scaton his brother-in-law, who was
taken prisoner by Edward I. at Loch-Urr, and hanged
at this place. It is now only employed as a bury-
ning place for suicides. It is not certain at what pe
riod Dumfries was erected into a royal borough; but it
must have been before the middle of the eleventh
century, as a grave-lane was discovered some time ago
bearing the date of 1079, and mentioning the person
buried under it to have been a merchant and burgess of
the town; and that it was a place of confluence in
the beginning of the fourteenth century, is evident
from this circumstance, that Edward II. called the
estates of Scotland to meet there in the year 1307. In
the abovementioned monastery too, K. Robert Bruce
killed his rival Cumming of lord of Badenoch, with
the assistance of James Lindalay and Roger Kirkpatrick,
on the 3th of February 1305. As to the present state of
the town, the houses are well built and commodious,
the streets spacious, open, and neatly paved. It has
two very elegant churches, an episcopal chapel with
a fine little organ, besides three meeting houses belong
ning to different dispositions of sectaries; a tolbooth
a council-chamber; 4 trades hall; a meal-market; a
strong prison; a correction-house; a large hospital;
an inn, with apartments for infane patients; a
narrow bridge of 9 arches over the river, said to have
been built by one of the three daughters and coheiris
of Alan lord Galloway. A large village, called the Bridge-end,
stands on the opposite side, and is within the strewtar
y of Kirkudbright. The faults for the county, and for the shire of Galloway and strewtar
y of Kirkudbright, are held in the town twice a
year. It is also the place for holding the sheriff
and assize courts, the quarter-sessions of the peace,
and the courts of the commissars of supply. It is
governed by a provost, three bailies, a dean of guild,
and a town-council, composed of merchants and the
conveyer and deacons of the incorporated trades, of
which there are seven, viz. square-men, smiths, wea
ners, tailors, shoemakers, skinners, and butchers; all
of whom are chosen into their respective offices at Mi
chaelmas annually. The trades got from king James
VI. in one of his journeys to England, a small silver
tube, like a pistle barrel, called the silver gun, with his
royal licence to shoot for it every year. At that fes
sional they all appear in arms, and march out of the town
under their respective colours, to some convenient place
where they shoot at a mark; and the person that hits
or shoots nearest to it returns to town, marching at
the head of the dale, and with the silver gun tied to
his hat with ribbons: after which they conclude the
day with a social entertainment. The town has a
weekly
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weekly market on Wednesday, with two annual fairs; the first on the Wednesday on or next after the 15th of February, and the other on the Wednesday on or next after the 25th of September. At these fairs vast numbers of horses and black cattle are sold; and no town in Scotland is better provided with all sorts of butcher-meat in their seafon. But though well situated for fuel at a cheap rate, it has only two manufactories, one for stockings and the other for cottons; but the latter only in its infancy. Its foreign trade for many years has only consisted of timber, iron, and other articles for home consumption. It gives the title of Earl to the chief of the family of Crichton; and is the seat of a presbytery and provincial synod. It contains about 6000 inhabitants.

DUMONT (Francis), a Frenchman; compiler of a general collection of treaties of commerce, alliance and peace, between the powers of Europe. This collection, with Barbevays's, containing the treaties B. C. of the several powers, makes 16 vols folio, very useful for historical writers. Dumont retired to Holland in 1720. The time of his death is uncertain.

DUMOSÆ (from Dumus, a buithe), an order of plants in the Fragmenta methodi naturalis Linnaeus, containing the following genera, viz. Viburnum, Timus, Quaia, Sambucus, Rondelaia, Bellisia, Gaffiaria, Ilx, Tomus, &c.

DUN, or BURGH, the name of an ancient species of buildings, of a circular form, common in the Orkney and Shetland islands, the Hebrides, and northern parts of Scotland. The latter point out the founders, who at the same time bestowed on them their natal name of borg, "a defence or castle," a Saxon-Gothic word; and the Highlanders universally apply to these places the Celtic name dun, signifying a hill defended by a tower, which plainly points out their use. They are confined to the countries once subject to the crown of Norway. With few exceptions, they are built within sight of the sea, and one or more within sight of the other; so that on a signal by fire, by flag, or by trumpet, they could give notice of approaching danger, and yield a mutual succour. In the Shetland and Orkney islands, they are most frequently called wart or wardhuils, which shows that they were garrisoned. They had their wardmaster, or watchman, a fort of sentinels, who stood on the top, and challenged all who came in sight. The garrison was an officer of the same kind, who not only was on the watch against surprize, but was to give notice if he saw any ships in distress. He was allowed a large horn of generous liquor, which he had always by him, to keep up his spirits. Along the Orkney and Shetland shores, they almost form a chain; and by that means not only kept the natives in subjection, but were situated commodiously for covering the landing of their countrymen, who were perpetually roving on piratical expeditions. These towers were even made use of as state-prisons; for we learn from Torfaeus, that after Sueno had surprized Paul, count of Caithness, he carried him into Southerrland, and confined him there in a Norwegian tower. Out of this country, no buildings similar to these are to be found, except in Scandinavia. On the mountain Swalberg in Norway is one: the Stix-bilkop, at Uplafi in Sweden, is another; and Umfæborg, in the same kingdom, is a third.

These towers vary in their inner structure; but externally are universally the same; yet some have an addition of strength on the outside. The burgh of Cullswick in Shetland, notwithstanding it is built on the top of a hill, is surrounded with a dry ditch 13 feet broad; that of Snaburgh in Unst, has both a wet and a dry ditch; the first cut, with great labour, through the live rock. The burgh of Moura is surrounded by a wall, now reduced to a heap of stones, and the inside is cylindrical, not taper, as usual with others. The burgh of Hogscler, upon an island in the loch of the same name, has also its addition of a wall; a peculiarity in a causeway, to join it to the mainland, and a singular internal structure. Numbers of little burghs, withingle cells, are scattered about these Islands, in the neighbourhood of the greater; and which probably were built by the poorer sort of people, in order to enjoy their protection. A multitude of places in these islands have the addition of burgh to their names, notwithstanding there is not a vestige of a tower near them; the materials having long since been carried away, and applied to various uses.

DUNBAR, a parliament town of Scotland, in the shire of East-Lothian, once remarkable for a strong castle, the key of Scotland from the east, and which gave shelter to Edward II. of England in his flight from Bannockburn, but of which scarce a vestige now remains. Here are still preserved some of the Scottish pikes, fixells long, and formed for both offence and defence. This town has now a tolerable trade in the fisheries, and is remarkable for making good malt. Dunbar has given titles of honour to different families, who are all now extinct.

DUNBARTON, the chief town of Lenox or Dunbarton shire in Scotland, situated in W. Long. 4. 32. N. Lat. 56. 30. It is remarkable for nothing but its castle. This is a steep rock, rising up in two points, and every where inaccessible, except by a very narrow passage or entry, fortified with a strong wall or rampart. Within this wall is the guard-house, with lodgings for the officers; and from hence a long flight of stone-steps ascends to the upper part of the castle, where there are several batteries mounted with cannon, the wall being continued almost round the rock. In the middle of this upper part where the rock divides, there are commodious barracks with a deep well, in which there is always plenty of water. Here likewise are the remains of a gateway and prodigious high wall, at the top of which there was a wooden bridge of communication from one rock to another. This gateway was sometimes blocked up during the intestine commotions of Scotland, so that garrisons of different factions possessed different parts of the castle, and each had a gate towards the water. The castle stands in the angle formed at the conflux of the Clyde and Leven; so that it is wholly surrounded by water, except a narrow isthmus, and even this is overflowed at every spring-tide; nor is there any hill or eminence within a Scots mile of this fortress. It commands the navigation of the Clyde; and, being deemed the key of the western Highlands, is kept in some repair, and garrisoned with invalids, under the command of a governor and some subaltern officers. The government of it is worth 700 l. a year. — Dunbar is a royal borough; and for-
Dunlce. on a ground-flat ally used as a theatre. This hall is
riveruncan~.

HIS of the miscellanies of his younger brother Mr Jabez trades,
was
no ship compass to Waterford
publifhed
iniffion.
the only
entrance from Dublin. In the

tations, was
·ed
Mr Hughes, 2 vols 12mo; in 1737;
of the miscellanies of his younger brother Mr Jabez
Hughes, for the benefit of his widow, in one volume
8vo; and in 1745, of the works of the Rev. Mr Samuel
Say, in one volume 4to. In 1726 he married
the only father of John Hughes, Esq; whom he long
survived. In 1734 his tragedy of Lucius Junius Brutus
was acted at Drury-Lane Theatre. It was published
in 1735, and again in 1747. The works of
Horace, in English verse, by several hands, were
published by him in two vols 8vo, with notes, 8c. in 1757.
A second edition, in four vols 12mo, with many
imitations, was published in 1762. In 1763 he collected
and republished "Seven sermons by archbishop
Herring, on public occasions, with a biographical pre-
face." He died Feb. 26. 1769, aged 80.

Dundalk, a town of Ireland, in the county of Louth, about 40 miles from Dublin. It is a large,
ancient, and thriving town, with a wide street, near
a mile long, and a very fine market-house, near the
entrance from Dublin. In the reign of Edward II.,
it was a royal city, and the last we read of where a
monarch of all Ireland was actually crowned and reigned.
It was formerly very strong, and had many towers and
small castles in it. It is very advantageously situated
for a most extensive inland trade, and the port is very
safe for shipping. The bay has good moorings at all
times, in four to upwards of eight fathoms water, with
even good land-marks, either for bringing up to, or
making the harbour; and in crossing the bar at high
water, or ordinary neap tides, there is from 15 to 18
feet water. The only cambrie manufacture in Ireland
is carried on in this town.

Dundee, a parliament town of Scotland, in the
shire of Forfar or Angus, is seated on the north side of
the river Tay, about 12 measured miles from its
mouth, 40 measured miles north of Edinburgh, and
22 east from Perth, in W. Long. 2°. 49'. N. Lat.
56°. 26'. Its situation for commerce is very advantage-
ous. Trading vessels of the largest burden can get
into the harbour; and on the quay there are three very
convenient and handsome warehouses built in 1776,
as well as good room for shipbuilding, which is carried
on to a large extent. The houses are built of stone,
generally three and four stories high. The market
place or high street in the middle of the town is a very
spacious oblong square, 360 feet long and 100 feet
broad; from whence branch out the four principal
streets, which with a number of lesser ones are all pa-
ed in the best manner. On the south side of the mar-
ket place stands the town-house; an elegant structure,
with a very handsome front, piazzas below, and a neat
spire over it 140 feet high. This building was finished
in the year 1734, and contains the guild-hall, the
court-room, a very neat mason-lodge, the bank, vaulted
repositories for the records, and the common pri-
son, which is in the upper story, and does honour to
the taste and humanity of the magistrates, under
whose auspices it was constructed, being well aired
 commodious rooms, at the same time very strong and
secure. Each prison is 20 feet by 12, and 7½ feet
high, well arched above and below.

The meal-market and shambles, which were for-
erally on the high street, and esteemed a nuisance, were
removed some years ago; and in the place of the
shambles, there is now erected by the incorporated
trades, on the east end of the above large square, a grand
building, with a large and elegant cupola: in the
ground-floor of which is a very neat coffee-room, and
several merchant shops; and in the upper stories pub-
lic rooms for each trade, and a common hall occasion-
ally used as a theatre. This hall is 50 feet long, 30
feet broad, and 25 feet high; having its front to the
square decorated with Ionic columns.

The opulence of the corporations, nine in number,
may be inferred from this, that they had, along with
the kirk feission, but very lately finished a most elegant
church when they set about building the hall. This
church, which is called St Andrew's Church, stands
on a rising ground a little north from the Cowgate
street; and has an elegant spire 130 feet high, with a
peal of bells much admired. There is a neat entry to
the church by a broad gravel walk, with grass plots
on every side; and the whole policies around it are
laid out with excellent taste, and in a superb style, as
complete and well executed as any in Scotland.

Dundee, beside St Andrew's church, has four
other churches, and five ministers on the legal estab-
ishment. The old church, in which were originally four
places of worship, when entire, had been a very mag-
nificent building, with a large square Gothic tower or
fpeeble 168 feet high, on the west end of the church. This
building was in the form of a cross, erected by David
Earl of Huntigton, brother to William I. of Scot-
land (furnamed the Lion), and was dedicated to the
Virgin Mary. This he did on his return from the
third crusade (in which with 500 of his countrymen
he had accompanied Richard I. of England) anno 1189,
in gratitude for his deliverance from several imminent
dangers, and particularly from shipwreck, by which
he had nearly perished when in fight of this town. At
the same time he changed the name of the town from
Alltlem to Dei Domum, whence its present name is
derived by many to be derived; while others maintain
that its name was Dunster, or "the Hill of Tay." The
word Alltlem in the Gaelic signifies "beautiful," and
takes such harmonizes very well with the scripture fente of the
Hill of God: The word Dunstay has the very same
signification, "the Hill of God," and both agree
with the delightful situation of Dundee, and unite in
giving it with propriety the name of Bonny Dundee.
The hill rises on the north of the town to a greater
height, and is called The Law of Dundee; law being
a Saxon word for a round hill such as it is On its top,
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Dundee.

Dundee. top there are evidently the remains of a camp, said to have been first erected by Edward I. of England, and lately repaired by General Monk. Where the meal-market stood is now erected an elegant Episcopal meeting-house, with handsome shops below.

Dundee had an old castle which was demolished by the famous Scots governor Sir William Wallace, who was educated in this town. The castle had proved very useful to Edward I. when he put a garrison into it to awe the inhabitants; but Wallace getting possession, ordered it to be destroyed, left it should again fall into the hands of the English. This treatment so exasperated Edward, that, taking the town by storm, he set fire to the churches; and a number of the inhabitants having taken sanctuary there with their most valuable effects, were all burnt along with them. At that time he burnt also a great part of the town. The defolation he brought on the church has continued ever since, till the year 1787, when a noble edifice began to be built on the site of the one that was burnt down, and is now finishing; in which the ancient Gothic of the outside is excellently united with internal modern architecture, making one of the largest and neatest churches in the kingdom, and again completing the superb structure as erected at the first by the Earl of Huntingdon.

This town suffered greatly last century during the troubles of Charles II. and the usurpation of Oliver Cromwell; being sometimes under the command of one party, and at others in the mercy of another. In 1645 the Marquis of Montrose took it by storm; and in 1651, under the command of the provost General Lumden, it vigorously-opposed General Monk, who carried it by storm the first of September, and put all in arms to the sword. And so great were the riches of Dundee, all the neighbouring gentlemen having retired to it with their best effects as a place of safety, that every private soldier in General Monk's army had near 60l. Sterling to his share of the plunder; there being above 60 merchant vessels in the harbour at that time, and the like number of vessels failed for England loaded with the spoils of the unfortunate inhabitants. By those and other invasions, the whole ancient records of the town were destroyed, except a deed of Queen Mary, signed by herself, conferring the present burying ground: and some charters of the Berean, and two Anabaptists.

Of the church, the present burying ground is the only place in Scotland we know of called 'The Hoft,' a Dutch word bearing all the sense of the English word court, having been formerly the burying-ground of one of the many religious houses that were in this town previous to the Reformation.

There are at present 113 vessels belonging to the port, of above 2000 tons burden, and near 1000 seamen. Of these vessels four went last season to Greenland, a trade of long standing here. And beside the three public warehouses on the shore, there are above twenty large private warehouses belonging to the merchants. The ships' stores are in very good order, and the whole town is very commodious; and have now made the passage over the Tay, where there is a great resort, so convenient, that travellers with their horses can get over at any time of tide, and a sufficient number of good boats properly manned are always ready. The river Tay opposite Dundee is about three miles broad; and being sheltered by high lands on both sides, is a safe road for ships of the greatest burden: the piers are extensive, broad, and well adapted for the purposes of loading and discharging vessels; and when the harbour is completed in the plan they are presently engaged in, there will not be one inferior to it in Scotland.

To enable the town to repair the damage done by Cromwell's army, and also their harbour and other public works, Charles II. granted them a small impost of one-sixth of a penny sterling, for 25 years, on the pleasure of ale brewed, or brought into the town for sale; which grant has been frequently renewed by subsequent parliaments; and the fund arising therefrom is most properly bestowed by the magistrates in improving the town, and making it more convenient and healthy. For their purposes, several new streets have been made, the old ones have been widened, and a large convenient one at a considerable expense carried down from the market-place to join a fine walk, shaded very neatly with trees, that leads from the shore. This new street makes the access easy and commodious, which formerly was much confined and steep.

Till the year 1745, the town had only draw-wells; but since that period it is much supplied from a large fine fountain of excellent water, conveyed thro' the town in lead pipes, and discharged by good wells at proper distances. Thee, with a fine well in the town's meadows, and a stream of water that runs thro' the ward and the meadows (two large beautiful greens on the north of the town), make it as well watered as any town in Scotland: and these greens, just at hand, serve all the inhabitants most commodiously for the necessary labours of washing and bleaching.

The number of inhabitants in Dundee have increased above 4000 since 1780. There was then an accurate list of them taken, when they amounted to near 16,000; and lately they were reckoned and found within a few of 20,000; and since the year 1780 they are fully doubled. Beside the established churches, there are three Episcopal meeting-houses, two of Seceders, one of Methodists, two of Independents, one Berean, and two Anabaptists. One of the Independents is of the Glasfite denomination. Mr John Glas, from whom they take that name, resided here; and his principles, though spread far and wide, have always had the greatest following in Dundee.

The trade in the town has increased amazingly of late. Its staple is undoubtedly the linen manufacture: for which in summer 1788 they imported from the Baltic 32 cargoes of flax, hemp, etc. near 3000 tons, beside several quantities from London, Leith, and other places; and on an average the brown linen stamped for the two preceding seasons at the stamp-office here amounted to about four millions of yards, in value about 119,000l. Sterling. The flax is wrought up into coarse linens, chiefly ofna- 

burgs, bleachers, and tailors flourishing, etc. which is sold partly bleached (several of the bleachers being well employed in the neighbourhood and partly browned. These linens are sent principally to London, Glasgow, and Liverpool, and from hence exported. Seven or eight
DUNDEE. Eight vessels are constantly employed in the trade between Dundee and London, one of which falls every ten or twelve days. The making fail-cloth has been long established here, and is carried on to a good extent. Two rope-works have succeeded well, and a buckram-work has also been established for several years. The Dundee coloured threads have been long used in buckram-work; and the making failures has been greatly promoted by the Bank; which is carried for of ancient Caledonia.

DUNFERMLINE. An excellent nursery at fall, and elegant villas, showing the wealth and prosperity of the inhabitants. Dundee is the birth-place of the celebrated and learned Hecutor Boethius, whose History of Scotland has been long in much reputation with many. It, with Perth, Forfar, St Andrew's, and Cupar, returns one member to the British parliament.

DUNFERMLINE. See DUNFERMLINE.

DUN, in husbandry. See Agriculture, No. 20.

DUN-Bird. See Upupa.

DUN Mere, in husbandry, places where foils and duns are mixed and digested together. The effluent of pits, prepared at the bottom with stone and clay, that they may hold water, or the moisture of the dung; and ought to be so situated, that the finks and drips of the houses and barns may run into them. Into these pits they cast refuse, fodder, litter, dung, weeds, &c., where they lie and rot together, till the farmer have occasion for them.

DUN Worms, a species of fly-worms, of a short and somewhat flat body, found in great plenty among cow-dung in the months of September and October.

DUNGANNON, the chief town of the county of Tyrone, in the province of Ulster in Ireland. It is Dungannon tenaet on a hill, and is a place of some strength.

DUNGARVON, a town of Ireland, in the county of Waterford. It stands on a bay of the same name, has a commodious harbour for ships, and is a walled town with a caftle. W. Long. 7. 55. N. Lat. 51. 57.

DUNIPACE. See the article Carron.

DUNKELD, a town of Scotland, in the shire of Perth, seated on the north side of the river Tay, is a situation truly romantic, and among very high and almost inaccessible crags, part naked and part wooded. It is the chief market town of the Highlands, and has been greatly improved with buildings by the Dukes of Athol.

The place is of great antiquity. It was the capital of ancient Caledonia. About the dawn of Christianity, a pictish king made it the seat of religion, by erecting a monastery of Culdees there; which King David I. in 1150 converted into a cathedral, and it ranked as the first in Scotland. The entire shell of the cathedral still remains, the east end serving for a kirk, on the north side of which is the burial place of the Dukes of Athol. The style of architecture is simple and elegant, the pillars round. The monument of one of its bishops remains in the south aisle of the nave, as also that of Alexander Stuart Earl of Buchan, third son of Robert II. called for his cruelty The Wolf of Badenoch, who died 1594. The tower at the west end, with a circular crack down one of its sides, adds to the picturesque appearance which the whole makes among the venerable pines at the end of the Duke's garden. His Grace's seat is a modern building, and not large, with pleasant walks and policies, and a fine cascade on the water of Brann, which in its way from the western hills forms an astonishing fall of 150 feet, called the Rambling Brig, from a narrow bridge made by the fall of two rocks across the stream. The pencil of Ross never formed a more horrid scene. The stream has a second fall, which, without seeing the other, would be deemed capital. Sir James Galloway, Master of requits to James VI. and Charles I. was created Lord Dunkeil 1645, whose grandson James was attainted at the Revolution, and dying at the beginning of this century, the title became extinct.

DUNKERS, DUNCARDS, or Tunkers. See TUNKERS.

DUNKIRK, a maritime town of the French Netherlands, situated in E. Long. 2. 28. N. Lat. 51. 10, and is the most easterly harbour on the side of France which is next to Great Britain. It was originally a mean hamlet, consisting only of a few fishermen's huts; but a church being built there, it was from that, and from its situation, which is a sandy eminence, called Dunkirk; dun signifying, in the old Gallic language, a hill; and kirk being the old Flemish name for church.

About the year 960, Baldwin Earl of Flanders, thinking the situation convenient, enlarged it into a kind of town, and surrounded it with a wall. In the year 1322, Robert of Flanders, who held it as an appendage, built a castle for its defence; which was afterwards demolished by the revolters of Flanders. Robert of Bar erected a fortification round it, the remains of which are visible on the side next the harbour. The emperor Charles V. who held it as part of Flanders, built
Dunkirk—built another castle to defend the harbour; but this was also demolished soon afterwards. In 1558, the French, under Marshal de Thermes, took Dunkirk by storm, and almost ruined the place; the Spaniards recovered it again in about a fortnight, and put all the French to the sword.

During a peace procured for the Dunkirkers by Philip II. of Spain, they rebuilt their town with greater splendor than before, and the inhabitants for a long time subsidized by privateers fitted out against the Dutch; and at length, growing rich by these hostilities, they fortified their town and harbour, and fitted out no less than 15 ships of war at their own charge.

In 1654, the Dunkirkers agreed with the inhabitants of Bergues to dig a canal, at their joint expense, for a communication between the two towns; which was some time afterwards effected. By this time, Dunkirk was become the chief harbour the Spaniards possessed in Flanders, which induced many foreigners to settle there; and it being necessary to enlarge the town for their accommodation, a new fortified wall was built at a considerable distance from the former. In 1649, it was besieged and taken by the prince of Condé. In 1662 it was retaken by the archduke Leopold, then governor of the Netherlands. France entering into a treaty with England in 1655, the Dunkirkers, with views of pecuniary advantage, fitted out privateers against both those powers: the consequence of which was, that the French, affixed by Cromwell, attacked and took it; and it was put into the hands of the English, in consequence of a treaty between them and the French. To the English it was even then of very great importance; for, during the war in which it was taken, the Dunkirkers had made prizes of no less than 250 of their ships, many of which were of great value. They therefore improved the fortifications, and built a citadel: yet they kept it only four years; for in 1662, two years after the restoration, Charles II. sold this valuable acquisition to France, for the paltry sum of 500,000/. In consequence of this sale, the town was taken possession of for the French king Louis XIV. by the count d’Estrées, on the 29th of November 1662. Louis having acquainted the celebrated engineer Monsieur Vauban, that he intended to make Dunkirk one of the strongest places in Europe, Vauban drew up a plan with that view, which was gradually executed. An arsenal was erected, large enough to contain all the stores necessary for fitting out and maintaining a large fleet of men of war; the fortifications on the land-side were constructed in a manner that was thought to render them impregnable; and towards the sea, the entrance of the harbour being properly formed, it was fortified by the jetties, and the two forts called Green Fort and the Fort of Good Hop at their extremities; the famous Rifbank was also erected on one side of the jetties, and Fort Gilliard on the other, to secure the town. These works were all completed in 1683; and in 1685, the whole circumference of the bay was faced with masonry, and the keys completely formed: at the same time care was taken to build at the entrance of this bay a sluice, almost 45 feet wide, that the ships within might be constantly allow. In 1699, the fort called the Cornichon, and some other works, were completed. But though 30 years had been now employed in improving the fortifications of Dunkirk, it was not yet in the state in which Louis intended to put it; and therefore, in 1701, he caused a new rifbank to be built, called Fort Blanc.

At the treaty of Utrecht, it having been made appear, that the privateers of Dunkirk had, during the war then closing, taken from the English no less than 1614 prizes, valued at 1,334,375L. Sterling, it was stipulated, that the fortifications of the city and port of Dunkirk should be entirely demolished; and the harbour filled up, so as never to be a harbour again.

The treaty, of which this demolition of Dunkirk was an article, was signed on the 28th of April 1713; but the demolition did not take place till the September following, when the queen deputed colonel Armstrong and colonel Clayton to oversee the execution of the treaty as far as concerned the works and harbour of Dunkirk.

Under the inspection of these gentlemen, the places of arms were broken down, the ditches filled up, and the demi-lunes, bastions, and covered way, totally destroyed; the citadel was razed, and the harbour and baion filled up; the jetties were also levelled with the strand, and all the forts which defended the entrance into the harbour were demolished. A large dam, or bar, was also built across the mouth of the harbour between the jetties and the town, by which all communication between the harbour and the canal, which formed its entrance, was entirely cut off. The sluices were also broken up, and the materials of them broken to pieces.

But this was no sooner done, than Louis XIV. ordered 50,000 men to work incessantly upon a new channel, the canal of Mardick, which in a short time they accomplished; by which the harbour was rendered almost as commodious as ever; but in 1717 this likewise was rendered unferviceable.

In the year 1720, during a great storm, the sea broke up the bar or dam, and restored to the Dunkirkers the use of the Harbour in a very considerable degree.

In the year 1740, when Great Britain was engaged in a war with Spain, Louis XV. set out about improving the advantage which Dunkirk had derived from the storm in 1720, by restoring the works, and repairing the harbour. He rebuilt the jetties, and erected new forts in the place of those which had been destroyed; and soon afterwards he espoused the cause of Spain, and became a principal in the war.

But at the peace of Aix-la-Chapelle in 1748, it was stipulated, that all the works towards the sea should be destroyed a second time; yet, before the declaration of the last war, the place was in as good a state of defence towards the sea as it was at any time during the war which was concluded by the treaty of Aix-la-Chapelle.

DUNSE, a market-town of Scotland, in the shire of Mers, situated in W. Long. 2. 15. N. Lat. 55. 42. It is seated on a rising ground in the middle of the shire, and has a weekly market for cattle. It is by some reputed the birth-place of the famous John Duns Scotus.—A mile south of the town is a well of mineral-water, of great use as a deodiment and antiscorbutic, first discovered in 1747 by Dr Thomas Simpson who practised there.

DUNSE
DUN scotus (John), a Franciscan friar, commonly called Doctor Subtilis, was born in the year 1274; but whether in England, Scotland, or Ireland, hath long been a matter of dispute among the learned of each nation. Dempster, Mackenzie, and other Scottish writers, affirm positively that he was born at Dunfermline, in the province of Fife, about fifteen miles from Berwick; and, to secure him more effectually, Mackenzie makes him descended from the Dunfes in the Mers. MacCaghwell, an Irish author, who wrote the life of this Scotus, proves him to have been born at Down in the province of Ulster in Ireland: but Leland, Bale, Camden, and Pits, assure us, that he was born at Dunfermline in the parish of Emildune, near Alnwick in Northumberland; and this opinion is rendered probable by the following conclusion of his manuscript works in the Library of Merton college in Oxford. — "Here end the writings of that subtle doctor of the university of Paris, John Duns, who was born in a certain village, in the parish of Emildune, called Dunfermline, in the county of Northumberland." We are told, that, when a boy, he became accidentally known to two Franciscan friars; who, finding him to be a youth of very extraordinary capacity, took him to their convent at Newcastile, and afterwards persuaded him to become one of their fraternity. From thence he was sent to Oxford, where he was made fellow of Merton college and professor of divinity; and Mackenzie says, that not less than 30,000 students came to Oxford to hear his lectures. His fame was now become so universal, that the general of his order commanded him to go to Paris, that the students of that university might also profit from his lectures. He went to Paris in the year 1304, where he was honoured first with the degree of bachelor, then of doctor of divinity, and in 1307 was appointed regent of the divinity schools; during his residence here, the famous controversy about the Immaculate conception of the Virgin Mary arose. Albertus Magnus maintained that she was born in original sin. Scotus advanced 300 arguments in support of the contrary opinion, and convinced the university of the truth of that, that she was really conceived immaculately. This important nonence, however, continued to be disputed till the year 1366, after the council of Basel, when the university of Paris made a decree, that no student, who did not believe the immaculate conception, should be admitted to a degree. Our author had not been above a year at Paris, when the same general of the Franciscans ordered him to remove to Cologne; where he was received with great pomp and ceremony by the magistrates and nobles of that city, and where he died of an apoplexy soon after his arrival, in the year 1308, in the 34th year of his age. Some writers have reported, that Scotus was buried in an episcopal coffin; and that, at the removing his bones, he appeared to have turned himself in his coffin. This doctor subtilis was doubleless one of the first wranglers of this time, admirably well versed in scholastic divinity, and a most indefatigable scribbler; but the misfortune is, that all his huge volumes do not contain a single page worth the perusal of a rational being. He was the author of a new sect of schoolmen called Scoti; who opposed the opinions of the Thomists, so called from St Thomas Aquinas. The reader will find a more particular account of Scotus in the Franciscan Martyrology, published at Paris in 1638. — He was a most voluminous writer; his works making 12 vols. folio, as published at Lyons by Luke Wadding, 1639.

DUNSTABLE, a town in Bedfordshire, with a market on Wednesdays. It is seated on a chalky hill; and has ponds in the streets, which are never dry though they are only supplied with rain water. It is remarkable for several good inns, it being a great thoroughfare on the northern road. It consists of four streets, intersecting each other at right angles; and in the centre is a round one of those beautiful crosses of queen Eleanor, which was destroyed by the enthuilasts in the time of the civil wars. W. Long, o. 29. N. Lat. 51. 50.

DUNSTAFFNAGE. See Lorne.

DUNSTAN, a famous saint, and archbishop of Canterbury; of whom the monkish historians give us the following account. He was descended from a noble family in Wexford, and educated in the abbey of Glas, or Glasnevin, near Dublin. Here he studied so hard, that it threw him into a violent fever which brought him to the very point of death. When the whole family were standing about his bed, disfused in tears, and expecting every moment to see him expire, an angel came from heaven in a dreadful form, and gave him a medicine which restored him to perfect health in a moment. Dunstan immediately started from his bedside, and ran with all his speed towards the church to return thanks for his recovery; but the devil met him by the way, surrounded by a great multitude of black dogs, and endeavoured to obstruct his passage. This would have frightened some boys; but it had no such effect upon Dunstan; who pronouncing a sacred name, and brandishing his stick, put the devil and all his dogs to flight. The church-doors being shut, an angel took him into his arms, conveyed him through an opening in the roof, and set him softly down upon the floor, where he performed his devotions. After his recovery, he purified his studies with the greatest zeal, and soon became a great master in philosophy, divinity, music, painting, writing, foundry, and, working in gold, silver, brass, and iron, &c. When he was a boy, he entered into holy orders, and was introduced by his uncle Athelstan archbishop of Canterbury to King Ethelstan: who, charmed with his person and accomplishments retained him in his court, and employed him in many great affairs. At leisure hours he used to entertain the king and his courtiers with playing on his harp, or some other musical instrument; and now and then he wrought a miracle, which gained him great admiration. His old enemy the devil was much offended at this, and prompted some envious courtiers to persuade the king that his favourite was a magician, which that prince readily believed. Dunstan discovering by the king's countenance that he had lost his favour, and resolving to resign rather than be turned out, retired from court to another uncle, who was bishop of Winchester. This good prelate prevailed upon his nephew to forsake the world and become a monk; after which he retired to a little cell built against the church-wall of Glasnevin. Here he slept, studied, prayed, meditated, and sometimes amused himself with forging several useful things in brass and iron. One evening, as he was working very busily at his forge,
DUN \[ [178] \]  DUN

Dunstan, the devil, putting on the appearance of a man, thrust his head in at the window of his cell, and asked him to make something or other for him. Dunstan was so intent upon his work that he made him no answer; on which the devil began to swear and talk obscenely, which betrayed the lurking fiend. The holy blacksmith, putting up a secret ejaculation, pulled his tongs, which were red-hot, out of the fire, seized the devil with them by the nose, and squeezed him with all his strength; which made his internal majesty roar and founder at such a rate, that he awakened and terrified all the people for many miles around. Thus far the legend.

Ridiculous as were these fictions, they served, in those times of ignorance, to procure Dunstan a reputation which has been confirmed by the authority of several succeeding historians. It appears that this extraordinary person was recalled to court by King Edmund, A. D. 941: who bestowed upon him the rich abbey of Glastonbury, which for his sake he honoured with many peculiar privileges. He enjoyed a very high degree of the favour of this prince during his short reign of six years; but he stood much higher in the favor of his brother and successor King Eredred, to whom he was confessor, chief confidant, and prime minister. He employed all his influence during this period of court-favour in promoting the interest of the monks of the Benedictine order, to which he belonged, and of which he was a most active and zealous patron. Having the treasures of these two princes, especially of the latter, very much at his command, he lavished them away in building and endowing monasteries for these monks, because almost all the old monasteries were in the possession of secular canons. Not contented with this, he persuaded Edred (who was a bigotted valetudinarian) to bestow such immense treasurers on the churches and monasteries by his will, that the crown was stripped of its most valuable possessions, and left in a state of indigence. This conduct of Dunstan, while he was in power, rendered him very odious to Edwina, who succeeded his uncle Edred, A. D. 955; and his rude behaviour to himself; and his beloved queen Elfgiva, raised the resentment of that prince so high, that he deprived him of all his preferments, and drove him into exile*. The banishment of Dunstan, the great patron, or (as Malmesbury calls him) the prince of monks, was a severe blow to that order, who were expelled from several monasteries; which were made the impure stables (according to the fame author) of the married clergy. But their sufferings were of not long continuance. For Edgar, the younger brother of Edwina, having raised a successful rebellion against his unhappy brother, and usurped all his dominions on the north side of the river Thames, recalled Dunstan, and gave him the bishopric of Worcester, A. D. 957. From this moment he was the chief confidant and prime minister of King Edgar, who became sole monarch of England, A. D. 959, by the death of his elder brother Edwina. In the following year Dunstan was raised to be archbishop of Canterbury; and being thus possessed of the primacy and assured of the royal support and affiance, he prepared to execute the grand design which he had long meditated, of compelling the secular canons to put away their wives and become monks; or of driving them out and introducing Benedictine monks in their room.

With this view he procured the promotion of Ofwald to the see of Worcester, and of Ethelwold to that of Winchester; two prelates who were monks themselves, and animated with the most ardent zeal for the advancement of their order. And these three great champions of the order found means, by their arts and intrigues in the course of a few years, to fill no fewer than 48 monasteries with Benedictines. But on the death of Edgar in 975 they received a check. The sufferings of the persecuted canons had excited much compassion; and many of the nobility, who had been overawed by the power and zeal of the late king, now espoused their cause and promoted their restoration. Elfwine Duke of Mercia drove the monks by force out of all the monasteries in that extensive province, and brought back the canons, with their wives and children; while Elfwine Duke of East Anglia, and Brithnoth Duke of Essex, raised their troops to protect the monks in these countries. To allay these commotions, several councils were held; in which Dunstan was so hard pushed by the secular canons and their friends, that he was obliged to promise some of his holy strangers; and finally, by dint of miracles, overcome all opposition*.

St Dunstan died A. D. 988, in the 64th year of his age, having held the bishopric of London, together with the archbishopric of Canterbury, about 27 years. As this prelate was the great reformer and promoter of the monastic institutions, the grateful monks, who were almost the only historians of those dark ages, have loaded him with the most extravagant praises, and represented him as the greatest wonder-worker and highest favourite of heaven that ever lived. To say nothing of his many conflicts which the devil, in which he often belaboured that enemy of mankind most ferocely, the following short story, which is told with great exultation by his biographer Otber: will give the reader some idea of the astonishing impiety and insolence of those monks, and of the no less astonishing blindness and credulity of those unhappy times.

"The most admirable, the most ineffimable Father Dunstan (says the author), whose perfections exceeded all human imagination, was admitted to behold the mother of God and his own mother in eternal glory: for before his death he was carried up into heaven, to be present at the nuptials of his own mother with the Eternal King, which were celebrated by the angels with the most sweet and joyous songs. When the angels reproached him for his silence on this great occasion, so honourable to his mother, he excused himself on account of his being unacquainted with those sweet and heavenly strains; but being a little instructed by the angels, he broke out into this melodious song, O King and Ruler of nations, &c. It is unnecessary to make any comment on this most shocking story.

The violent and too successful zeal of Dunstan and his associates, in promoting the building and endowing a great number of houses for the entertainment of useless monks and nuns, was very fatal to their country: for by this means a spirit of irrational unmanly superstition was diffused amongst the people, which debauched their minds and diverted them from nobler pursuits; and a very great proportion of the lands of England being put into hands who contributed nothing.
DUP [179] DUR

DUPONDIUS, in antiquity, a weight of two Dupondius pounds, or a money of the value of two as. See As.

As the ass at first weighed a just pondo or libra, the dupondius then weighed two; and hence the name.

And though the weight of the ass was afterwards diminished, and of consequence that of the dupondius also, yet they still retained the denomination. See POUND and LIBRE.

DUPPA (Brian), a learned English bishop born in 1389 at Lewisham in Kent, of which place his father was then vicar. In 1634, he was instituted chancellor of the church at Sarum, and soon after made chaplain to Charles I. He was appointed tutor to Charles prince of Wales, and his brother James duke of York; was made bishop of Chichester; and in 1641 translated to Salisbury, though the confusions that followed deprived him of all benefit from his promotion. Charles I. held him in high esteem, and he is said to have affiled the king in composing the Eikon Basi{tides}. On the Restoration he was made bishop of Winchelsea, and lord high almoner; but died in 1662. He bequeathed large sums to charitable purposes; and published a few sermons, with other religious pieces.

DURANDUS (William), born at Puimosson in Provence in the 13th century, was one of the most knowing lawyers of his time. Pope Martin made him one of his nuncios, and then bishop of Mende and Languedoc. His Speculum Juris gave him the name of Speculator; his second piece was Rationale divinorum officiorum, containing eight books. He wrote several others.

DURANTA, in botany: A genus of the angiosperma order, belonging to the didynamia class of plants; and in the natural method ranking under the 40th order, Perisonate. The calyx is quinqued, superior; the berry tetrapermous; the seeds bilocular.

DURATION, an idea we get by attending to the fleeting and perpetual perishing parts of succession. See Metaphysics.

Duration, is marked by certain periods and measures, is what we most properly call time. See Time.

DURATION of Ailion, according to Aristotle, is confined to a natural day in tragedy; but the epopea, according to the same critic, has no fixed time. See Poetry.

DURER (Albert), descended of an Hungarian family, and born at Nuremberg in 1471, was one of the best engravers and painters of his age. He was at the same time a man of letters and a philosopher; and he was an intimate friend of Erasmus, who reviled some of the pieces which he published. He was a man of business also; and for many years the leading magistrate of Nuremberg. Though not the inventor, he was one of the first improvers of the art of engraving; and he himself executed a great many things in the year 1513, which was engraved on copper, for expedition, having an inextricable fund of designs. In many of these prints which he executed on copper, the engraving is elegant to a great degree. His Hell Scene particularly, which was engraved in the year 1513, is as highly finished a print as ever was engraved, and as happily executed. In his wooden prints too we are surprized to see so much meaning in so early a master; the heads so well marked, and every part so well executed.

thing to its defence, rendered it an easy prey, first to the insulting Danes, and afterwards to the victorious Normans.

DUNUM, a Celtic term, denoting a hill or eminence; and which often concurs to form the names of towns; to signify their high situation, places of strength or citadels, hills or eminences, being adapted to such structures. See Dun.

DUNUM (Ptolemy), a town of Ireland; now thought to be Down or Downe-Strick, in the county of Down.

W. Long. 5. 57. N. Lat. 54. 23.

DUO, in music, a song or composition, to be performed on two parts only, one fung, the other played on an instrument, or by two voices.

Du is also when two voices sing different parts, as accompanied with a third, which is a thorough bass. It is seldom that unisons and octaves are used in duos, except at the beginning and end.

DUODECIMA, in music, is the twelfth or the fifth doubled.

DUODENUM. See Anatomy, p. 727.

DUPIN (Lewis Ellis), a learned doctor of the Sorbonne, and one of the greatest critics of his time, especially in ecclesiastical matters, was born at Paris in 1657. When he published the first volume of his Bibliothéque Universelle des Auteurs Ecclesiastiques, in 1686, the liberty with which he treated some ecclesiastical writers, gave such offence, that M. de Harlay, archbishop of Paris, obliged Dupin to retract many propositions, and suppress the work. He was nevertheless suffer'd to continue it, by altering the title from Bibliothéque Universelle, to Bibliothéque Nouvelle. This great undertaking continued in several successive volumes, though insufficient to occupy the life of an ordinary man, did not hinder M. Dupin from obliging the world with several other works. He was a man of prodigious reading; and had an easy happy way of writing, with an uncommon talent at analyzing the works of an author; which makes his Ecclesiastical Bibliotheca so valuable. M. Dupin was professor of philosophy in the royal college; but was banish'd some time from the chair at Chatellerault, on account of the famous Cas de Conflitutions; but was restored, and died in 1719.

DUPLE, among mathematicians, denotes the ratio of 2 to 1. Thus the ratio of 8 to 4 is duple, or as 2 to 1.

Sub-Duple Ratio, is the reverse of the former, or as 1 to 2. Such is 4 to 8, or 6 to 12.

Duplicate, among lawyers, denotes a copy of any deed, writing, or account. It is also u'd for the second letters-patent, granted by the lord chancellor in a cafe wherein he had before done the fame. Also a second letter written and fent to the fame party and purpoze as a former, for fear of the firft's milcarrying, is called a duplicate.

Duplicate Proportion or Ratio. See Ratio.

Duplication, in general, signifies the doubling of any thing, or multiplying of it by 2: also the folding of any thing back again on itself.

Duplication, among anatomists, a term used to denote the folds of any membrane or vessel; thus we say, the duplicatures of the intestines, peritoneum, &c.
This artist seems to have understood the principles of design. His composition, too, is often pleasing; and his drawing generally good. But he knows very little of the management of light; and still less of grace; and yet his ideas are purer and more elegant than we could have supposed from the awkward archetypes which his country and education afforded. In a word, he was certainly a man of a very extensive genius; and, as Vafari remarks, would have been extraordinary in his own life-time, and divided into 4 wards, fends 4 members to parliament, eagerly brought up; which put his wife, who was a pays three portions of the land-tax, and provides amufement to order of law; or is threatened to be killed, mai-ih. obligation, by dureife. name; and fuch fpecialty, the party may plead, that it was brought coin money. The courts of and all that of any writer extant, yet there Devonlhire; but when, where; or of what family, vith fey'S bend merry l.-Iaxima Crefarienfis. and bend DURHAM (biihepric division of the counties, being at that time considered as a part of Yorkshire. At present it is included in the northern circuit, in the province of York; and is a diocese and principality under the go-
vernment of its own bishop, being a county palatine, Durham, the second in rank, and the richest in England. It is bounded on the north by Northumberland, on the south by Yorkshire, on the east by the North Sea, and on the west by Cumberland. It is 39 miles long, 35 broad, and 107 in circumference; containing 410,000 square acres, or 758 square miles; with 97,000 inhabitants, 80 parishes, 21 vicarages, one city (Durham), and 9 market-towns, viz. Stockton, Sunderland, Barnard-Caflle, Darlington, Stanhope, Hartlepool, Aukland, Stan­drop, and Marwood; besides 223 villages. It is di­vided into 4 wards, sends 4 members to parliament, pays three portions of the land-tax, and provides 400 of the national militia. It has 21 parks, 4 castles, and 20 bridges, with the rivers Tees, Tine, Wer, Tame, Lune, Darwent, Gaunfles, Skern, &c. The Lune and Teesdale forests. Its principal products are lead, coal, iron, corn, malt, salt, glass, fine ale, with excel­lent butter and salmon. The soil is various; the south is rich, but the western parts rocky and moor­ish.

Durham, as already observed, is a county palatine, governed by the bishop, who had formerly great prerogatives. He had power to create barons, appoint judges, convolve parliaments, raise taxes, and coin money. The courts of justice were kept in his name; and he granted pardons for treasons, alienations, rapes, murders, and felonies of every denomination. He created corporations, granted markets and fairs, created officers by patent, was lord admiral of the seas and waters within the county palatine: great part of the lands were held of the see in capite. In a word, he exercised all the power and jurisdic­tion of a sovereign prince. How and at what period these prerogatives were obtained, it is not easy to determine. Malmbury says, the lands were granted by king Alfred, who likewise made the church a sanctuary for criminals. This see was anciently called the patrimony of St Cuthbert, who had been bishop of Landisfarne or Holy Island near Berwick. His bones being transferred to Durham, were long esteemed as precious relics; and the people of the country con­sidered themselves as Holy men, exempted from all other but holy work, that is, the defence of St Cuth­bert’s body. Certainly it is, they pretended to hold their lands by this tenure; and refused to serve out of the county either for the king or bishop: but king Edward I. broke through these privileges, and curtailed the prerogatives of the bishops, which were still further abridged by Henry VIII. Nevertheless, the bishop is still Earl of Sadberg, a place in this county which he holds by barony. He is sheriff paramount, and appoints his own deputy, who makes up his audit to him, instead of accounting to the exchequer. He has all the forfeitures upon outlawries: and he and his temporal chancellor act as justices of the peace for the county palatine, which comprehends Creke in Yorkshire, Bedlington, Northam, and Holy Island, in Northumberland, the inhabitants of these places having the benefit of the courts at Durham. The judges of afize, and all the officers of the court, have their ancient salaries from the bishop; and he con­stitutes the standing officers by his letters patent. He has the power of presiding in person in any of the courts of judicature. Even when judgment of blood
The town is said to have been built about 120 years ago; on the spot where an elegant building begun by bishop Carilephus, and at the end of the 11th century. The cathedral was begun by bishop Carilephus in the 11th century. It is a large, magnificent, Gothic structure, 411 feet long, and 80 feet wide, having a crofs aisle in the middle 170 feet in length, and two smaller ailes at each end. On the south side is a fine cloister; on the east, the old library, the chapter-house, and part of the deanery; on the west, the dormitory, under which is the treasury and a chantry; and on the west side is the new library, an elegant building begun by dean Sturhury about 70 years ago, on the spot where stood the old reflorey of the convent. The middle tower of the cathedral is 213 feet high. The whole building is arched and supported by huge pillars. Several of the windows are curiously painted; and there is a handfome screen at the entrance into the choir. Sixteen bishops are interred in the chapter-house, which is 75 feet long and 35 feet broad, arched over-head, with a magnificent fan in the upper end for the installation of the bishops. The conftory is kept in the chapel or west aisle called Galilee, which was built by bishop Pudsey, and had formerly 16 altars for women, as they were not allowed to advance farther than the line of marble by the side of the font; here likewise are deposited the bones of the venerable Bede, whose elogium is written on an old parchment scroll that hangs over his tomb. The long crofs aisle, at the extremity of the church, was formerly distinguished by nine altars, four to the north, and four to the south, and the most magnificent in the middle dedicated to the patron St Cuthbert, whose rich shrine was in this quarter, formerly much frequented by pilgrims. The church is poifoned by some old records relating to the affairs of Scotland, the kings of which were great benefactors to this cathedral. The ornaments here used for administering the divine offices, are said to be richer than those of any other cathedral in England. Before the reformation it was distinguished by the name Ecclesia junct & Marie et junct Cuthbert; but it obtained the appellation of Ecclesia cathedrales Chrifi et beate Mariae, in the reign of Henry VIII. who endowed the deanery with 12 prebendaries, 12 minor canons, a deacon, sub-deacon, 16 lay finging men, a schoolmaster and usher, a master of the choir, a divinity reader, eight alms-men, 18 scholars, 10 choiristers, two vergers, two porters, two cooks, two butlers, and two sacriffenians. On the south side of the cathedral is the college: a spacious court formed by the houfes of the prebendaries, who are richly endowed and extremely well lodged. Above the college gate, at the east end, is the exchequer, and at the west, a large hall for entertaining strangers, with the granary and other offices of the convent. The college-school, with the master's houfe, stands on the north side of the cathedral. Between the churchyard and caflle is an open area called the palace green; at the west end of which stands the thirle-hall, where the affizes and fessions are held for the county. Hard by is the library built by bishop Cofin; together with the exchequer raised by bishop Nevil, in which are kept the offices belonging to the county-palatine court. There is an hospital on the east, endowed by bishop Cofin, and at each end of it are two schools founded by bishop Langley. On the north, is the caflle built by William the Conqueror, and afterwards converted into the bishop's palace, the outward gate of which is at present the county-goal.

The city confifts of three manors; the bishop's manor, containing the city liberties and the bailey, held of him by the fervice of caflle-guard; the manor of the dean and chapter, consisting of the Elvet's crofs gate, forty-fouth gate street; and the manor of Gilligate, formerly belonging to the dissolved hospital of Keypar in this neighbourhood, but granted by Edward VI. to John Cockburn, lord of OrmmOUNT, and late in the possession of John Tempert, Esq.

The bishoppic of Durham is deemed the richest bishoppic in the kingdom; and the prebends are frequently styled the Golden Prebends of Durham. The diocese contains the whole counties of Durham and Northumberland, except the jurisdiction of Hexham in the latter. It hath also one parish in the county of Cumberland: making in the whole 135 parifhes, whereof 87 are improper. The fee is valued in the king's books at L. 28 sc 1: 51, but is computed to-be:
DUR

Duria

be worth annually L. 3700. The elegey's tenth a-

nume L. 385: 5: 6t. It has two archiepiscopiz, viz.

of Durham and Northumberland. This fee hath gi-

ten to the church of Rome eight faints and one cardi-

al; and to the English nation one lord chief justice,

five lord chancellors, three lord treasurers, one prin-

cipal secretary of state, one chancellor to the univer-

sity of Oxford, and two masters of the rolls.

In the neighbourhood of this city is Nevil's crofs,

famous for the battle fought in the year 1346, against

David II. king of Scotland, who was defeated and
taken.

DURIO, in botany: A genus of the polyandria

order, belonging to the polyadelphia class of plants.

The calyx is a monophyllous perianthium; the corol-

la has five petals growing to the calyx; the stamens

are conjointed in five bodies; the germ is roundish; the

style bristy, the length of the stamina. The fruit is a

roundish apple everywhere muricated; the seeds have a

mucous orilla.

DURNIUM, or Durnovaria, a town of the Du-

rotriges in Britain. Now Dorchester, the capital of

Dorsetshire, on the borders of Huntingdon.

Durobrivae (anc. geog.), a town of the Catu-

euchlani in Britain. Now in ruins, which lie on the

Nen, between Caister and Drongford, in Northamp-

tonshire, on the borders of Huntington.

Durobrivae, or Durocibra, a town of the Tri-

nubartes in Britain; whose ruins are situated be-

tween Flamstead and Redburn, in Hertfordshire.

Durobrivae, 25 miles to the west of Duro-

vernun, or Canterbury; from which it appears to be

Rochester town, confirmed by the charter of founda-

tion of the church, in which it is called Durobriva.

Durocasses, Durocassium, Durocasae, and

Durocasses, a town of the Carnutes in Gallia Celtic-

a; now Dureux. See Druide.

Durocormovium (anc. geog.), a town of Brit-

ain; now Carew, in Gloucestershire (Cam-

den), Called Corinum by Ptolemy.

Durocortorum, or Durocortora, a town of the Rhem-

ii in Belgica; now Reims in Champaign.

E. Long. 4. N. Lat. 49. 20.

Duroia, in botany: A genus of the monogynia

order, belonging to the hexadendra class of plants.

The calyx above is cylindrical and loped; the border

six-parted; there are no filaments; the fruit a hif-

pid apple.

Durolenum, a town of the Cantii in Britain;

now Leubane, in Kent (Camden); Charing (Talbot).

Durolitum, a town of the Trinobantes; now

Leetum, on the Ley, in Essex (Camden).

Durotriges, an ancient Britsh nation, seated in

that part of the country which is now called Dor-

setshire. Their name is derived from the two British

words Dur "water," and Trigo "to dwell;" and it is

no lefs evident that they got their name from the fi-

tuation of their country, which lies along the sea-coast.

It is not very certain whether the Durotriges formed

an independent state under a prince of their own, or

were united with their neighbours the Danuains; as

they were reduced by Vellapian under the dominion

of the Romans, at the same time, and with the same

care, and never revolted. The peaceable disposition

of the inhabitants was probably the reason that the Ro-

mans had so few towns, forts, and garrisons, in this

pleasant country. Duroceter, its present capital, seems
to have been a Roman city of some consideration, though

antiquaries are not agreed about its Roman

ame. It is most probable that it was the Durno-

varia in the 12th Iter of Antoninus. Many Roman

coins have been found at Duroceter; the military

way, called Feenig-Street, passed through it; and some

vestiges of the ancient stone wall with which it was

surrounded, and of the amphitheatere with which it

was adorned, are still visible. The country of the Du-

rotriges was included in the Roman province called

Flavia Caetariensia, and governed by the president of

that province, as long as the Romans kept any footin

g in these parts.

Dury (John), a Scots divine, who travelled much,

and laboured with great zeal to reunite the Lutherans

with the Calvinists. His discouragement in this

scheme started another still more impracticable; and

this was to reunite all Christians by means of a new

explication of the Apocalypse, which he published at

Francfort in 1675. He enjoyed then a comfortable

retreat in the country of Hesse; but the time of his

death is unknown: his letter to Peter du Moulin con-

cerning the state of the churches of England, Scotland,

and Ireland, was printed at London in 1658, by

the care of du Moulin, and is esteemed to be curious.

Dusseldorf, a city of Westphalia in Ger-

many, and capital of the duchy of Berg. It is situated at

the conflux of the river Duffel with the Rhine, in E.

Long. 6. 20. N. Lat. 51. 15.

Dutchy. See Dutchy.

Duty, in general, denotes any thing that one

is obliged to perform.

Duty, in a moral sense. See Moral Philosophy.

Duty, in polity and commerce, signifies the impos-

sed on merchandise, at importation or exportation,

commonly called the duties of customs; also the taxes
of excise, stamp-duties, &c. See Customs, Excise,

&e.

The principle on which all duties and customs

should be laid on foreign merchandise which are

imported, are such as tend to cement a mutual friend-

ship and traffic between one nation and another; and

therefore due care should be taken in the lay-

ing of them, that they may answer so good an end,

and be reciprocal in both countries: they should be

so laid as to make the exports of a nation at least

equal to its imports from those nations wherewith it

trades, so that a balance in money should not be

lilted out, to pay for the goods and merchandise of

other countries; to the end that no greater number

of our landholders and manufacturers should be depre-

ved of their revenues arising from the product of

the lands, and the labour of the people, by foreign

importations, than are maintained by exportations to

such countries. These are the national principles on

which all our treaties of commerce with other countries

ought to be grounded.

Duty, in the military art, is the exercise of those

functions that belong to a soldier: with this distinc-

tion, that mounting guard and the like, where there is no

enemy directly to be engaged, is called duty; but their

marching to meet and fight an enemy is called going

on service.

DUUM-
The following rate Ii - {IS

smallness of fame way or other be artificial methods to prevent the growth of boys dwarfs we was only two feet and an hand-breadth.

femail kinds: thus there are dwarfs of the human

dwarf-dogs, dwarf-trees, &c.

greatly inferior in such as DUYVELAND, one of the islands of Zealand, in the United

 nors, and without them the oracles of the fibyls could warse, from among the patricians, and held their office for life: they

office of their fitting of ships, and giving their commisions to the marine officers, &c.

dwarf

sacred, were magistrates created by Tarquinius Superbus, for the performance of the sacrifices, and keeping of the ibyls books. They were chosen from among the patricians, and held their office for life: they were exempted from serving in the wars, and from the offices imposed on the other citizens, and without them the oracles of the ibyls could not be consulted.

DUAL, or DIVELAND, one of the islands of Zealand, in the United Provinces, lying eastward of Schonen, from which it is only separated by a narrow channel,

DWAL, in heraldry, the herb nightshade, used for such as alazon with flowers and herbs, instead of metals, stone, &c., for fable or black.

DWARF, in general, an appellation given to things greatly inferior in size to that which is usual in their several kinds: thus there are dwarfs of the human species, dwarf-dogs, dwarf-trees, &c.

The Romans were passionately fond of dwarfs, whom they called minori natur, inasmuch that they often used artificial methods to prevent the growth of boys designed for dwarfs, by enclosing them in boxes, or by the use of tight bandages. Angustus’s niece, Julia, was extremely fond of a dwarf called Sopais, who was only two feet and an hand-breadth high. We have many other accounts of human dwarfs, but most of them deformed in some way or other besides the smallness of their size. Many relations also concerning dwarfs we must necessarily look upon to be fabulous, as well as those concerning giants. — The following history, however, which we have reason to look upon as authentic, is too remarkable not to be acceptable to the generality of our readers.
D W I [ 184 ] D Y E

A

D W I

metts. He is described by the count as possessing all
the graces of wit, united with a found judgment and
an excellent memory; so that we may with justice say
of M. Borulawski, in the words of Seneca, and nearly
in the order in which he has used them, "Pulsa ingenio
fortitumnam ac beatissimum sub quidem corporisculo
literarum." Epift. 66.

Count Borulawski was the fon of a Polish noble-
man attached to the fortunes of king Stanislaus, who
lost his property in consequence of that attachment,
and who had six children, three dwarfs, and three well-
grown. What is singular enough, they were born al-
ternately, a big one and a little one, though both pa-
rents were of the common size. The little count's
youngest sister was much less than him, but died at
the age of 23. The count continued to grow till he
was about 30, and has at present attained his 51st
year, and the height of three feet two inches. He
ever experienced any sickness, but lived in a polite
and affluent manner under the patronage of a lady, a
friend of the family, till love at the age of 41 intruded
into his little peaceful bosom, and involved him in
matrimony, care, and perplexity. The lady he chose
was of his own country, but of French extraction, and
the middle size. They have three children, all girls,
and none of them likely to be dwarfs. To provide
for a family now became an object big with difficulty,
requiring all the exertion of his powers (which could
promote but little) and his talents, of which music
alone afforded any view of profit. He plays extremely
well upon the guitar: and by having concerts in fe-
veral of the principal cities in Germany, he raised
temporary supplies. At Vienna he was persuaded to
turn his thoughts to England, where it was believed
the public curiosity might in a little time benefit him
sufficiently to enable him to live independent in so
cheap a country as Poland. He was furnished by very
respectable friends with recommendations to several
of the most distinguished characters in that kingdom,
as the duchess of Devonshire, Rutland, &c. &c. whose
kind patronage he is not backward to acknowledge.
He was advised, if possible, to be seen as a curiosity,
and the price of admission was fixed at a guinea.
The number of his visitors, of course, was not very
great. After a pretty long stay in London he went
to Bath and Bristol; visited Dublin and some other
parts of Ireland; whence he returned by way of Li-
verpool, Manchester, and Birmingham, to London.
He also visited Edinburgh and some other towns of
Scotland. In every place he acquired a number of
friends. In reality, the ease and politeness of his man-
ners and address pleased no less than the diminutive,
yet elegant, proportions of his figure alludeth those
who visit him. His person is pleasing and graceful, and
his look manly and noble. He speaks French fluently,
and English tolerably. He is remarkably lively and
cheerful, though fitted for the most serious and ration-
el conversation. Such is this wonderful little man—
an object of curiosity really worthy the attention of
the philosopher, the man of taste, and the anatomist.
His life has been published, written by himself.

D W I A, the name of two large rivers; one of which
rises in Lithuania, and, dividing Livonia from Cour-
land, falls into the Baltic Sea a little below Riga; the
other gives name to the province of Dwina in Russia,
discharging itself into the White Sea a little below
Archangel.

D Y C K. See V A N D Y C K.

D Y E, in architecture, any square body, as the trunk
or notched part of a pedestal; or it is the middle of
the pedestal, or that part included between the base
and the cornice; so called because it is often made
in the form of a cube or die. See A R C H I T E C T U R E, n.61.

D Y E R, a perfon who professes the art of dyeing all
manner of colours. See D Y E I N G.

D Y E R (Sir James), an eminent English lawyer,
chief judge of the court of common pleas in the reign
of Queen Elizabeth. He died in 1581; and about 20
years after was published his large collection of Re-
ports, which have been highly esteemed for their suc-
cinctness and solidity. He also left other writings be-
hind him relative to his profession.

D Y E R (John), the son of Robert Dyer, Esq.; a Welsh
folicitor of great capacity, was born in 1700. He
pafted through Westminster-school under the care
of Dr Friend, and was then called home to be instruc-
ted in his father's profession. His genius, however, led
him a different way; for besides his early taste for
poetry, having a passion no less strong for the arts of
design, he determined to make painting his profession.

With this view, having studied a while under his master
he became, as he tells his friend, an itinerant painter,
and wandered about South Wales and the parts adja-
cent; and about 1727 painted Grongar Hill. Being
probably unsatisfied with his own proficiency, he made
the tour of Italy; where, besides the usual study of
the remains of antiquity, and the works of the great
masters, he frequently spent whole days in the country
about Rome and Florence, sketching those picturesque
prospects with facility and spirit. Images from hence
naturally transferred themselves into his poetical com-
positions: the principal beauties of The Ruins of Rome
are perhaps of this kind; and the various landscapes in
The Fleece have been particularly admired. On his re-
turn to England, he published The Ruins of Rome,
1740; but soon found that he could not relish a town-
life, nor submit to any of the afflictions required
in his profession. As his turn of mind was rather serious, and
his conduct and behaviour always irreproachable, he
was advised by his friends to enter into holy orders;
and it is presumed, though his education had not been
regular, that he found no difficulty in obtaining them.
He was ordained by the bishop of Lincoln, and had a
law degree conferred on him.

About the same time he married a lady of Colehill
named Enfor; "whose grandmother (says he) was a
Shakespeare, descended from a brother of every body's
Shakespeare." His ecclesiastical provision was a long
time but slender. His first patron, Mr Harper, gave
him, in 1741, Calthorpe in Leicetershire, of 80l.
a-year, on which he lived ten years; and in April 1757
exchanged it for Belchford in Lincolnshire, of 75l.
which was given him by lord chancellor Hardwicke, on
the recommendation of a friend to virtue and the muses.
His condition now began to mend. In 1752, Sir John
Heathcote gave him Coningham, of 140l. a-year; and
in 1756, when he was LL. B. without any solicitation
of his own, obtained for him from the chancellor Kirby

— or
DYE

IN the utmost latitude of the word, may be defined, The art of tinging cloth, stuff, or other matter, with a permanent colour, which penetrates the substance thereof. It is, however, commonly restrained to the art of tingling silk, wool, cotton, and linen, with different colors; and, as such, is practised as a trade by those who do not meddle with any of the other branches, as staining of leather, &c.

The dyeing art is of great antiquity; as appears from the traces of it in the oldest sacred as well as profane writers. The honour of the invention is attributed to the Tyrians; though what leftens the merit of it is, that it is said to have owed its rise to chance, with by which any colouring substance can be made to fuse, and for a consumptive disorder, with a short account of himself prefixed.

Sect. I. Theory of Dyeing.

BEFORE we can enter into any consideration of the Sals the true theory of dyeing, it is necessary to make the following observation concerning the practice, namely, that fafts are almost the only means we are acquainted with by which any colouring substance can be made to mix itself upon those matters which are the common subjects of dyeing. A solution of cochineal, for instance, will of itself impart no permanent colour to a piece of woolen cloth put into it. The red colour of the cochineal will indeed stain the cloth while it remains immersed in the solution; but as soon as it is taken out and washed, this temporary stain will immediately vanish, and the cloth become as white as before. If now the cloth is dipped in the solution of any saline substance, alkalis alone excepted, and then immersed in the solution of cochineal for some time, it will come out permanently coloured; nor will the colour be dischargéd even by washing with soap and water. If a quantity of salt is added to the solution of cochineal, and the cloth put in without being impregnated with any saline substance, the effect will be the same; the cloth will come out coloured; only in this last case, it must be well dried before washing it with soap, or most of the colour will be discharged.

By comparing this with what is delivered under the article Cochineal, in a more rational theory of dyeing. It is there gulation. remarked, that a saline substance (solution of tin in aqua regia) had a surprising power of coagulating the colouring matter of certain solutions, such as cochineal, Brazil-wood, log-wood, &c. If therefore a piece of cloth is previously impregnated with this solution, and put into the colouring one, it is plain that some part of the colouring matter will be coagulated by the solution remaining in the cloth, in the very same manner that it would have been if a small quantity of the saline solution had been poured into the other. The cloth therefore will take up a part of the colouring matter, which cannot be discharged but by entirely discharging the solution of tin. This, however, seems to unite

Dyer's Weed, in botany. See Reseda.
DYING.

Itself with the cloth very firmly, so that scarce a particle of colour will be discharged by washing in plain water, or even with soap; nor can the whole be taken out without boiling the cloth in a solution of fixed alkali.

Though solution of tin produces this coagulation in the most remarkable manner, it is not to be doubted that the same power is possewed in some degree by most of the neutrals and imperfect salts. Alum possews it very considerably, though not so much as solution of tin; and hence it is very much used in dyeing, as well as sugar of lead, which also has a very strong power of coagulation. The processes of dyeing, therefore, seems to be most analogous to that of the coagulation or curdling of milk. Before it has suffered this change, the milk is easily mible with water, but after it is once coagulated, the curd, or caeous part, is very difficultly soluble in any liquid whatever. In like manner, the colouring matter in the solution of cochineal, before the cloth is put in, is easily soluble in water, and may be diffused through any quantity of fluid: but no sooner is the cloth dipped in it, than the saline substance contained in the cloth coagulates that part of the colouring matter which lies in immediate contact with it; and as all the fluid successively comes into contact with it, the whole of the colour is by degrees coagulated and deposited on the cloth.

To account for the strong adhesion of the colour to the dyed cloth, several hypotheses have been formed. One is, That the fibres of wool, silk, &c. are hollow tubes; that the colouring matter enters them, and then itself with the cloth very firmly, so that scarce a particle of colour will be discharged by washing in plain water, or even without boiling the cloth in a solution of fixed alkali.

Itfelf with the cloth very firmly, so that scarce a particle of colour will be discharged by washing in plain water, or even without boiling the cloth in a solution of fixed alkali.

Illoconcerning the adhesion of the colour.

Another hypothesis is, That the fibres are solid, or at least by the preparatory operations, or in some of the dyeing ingredients themselves. He supposes that the pores of the stuff are cleansed and enlarged by the preparatory salts, and by the boiling water, in such a manner as to receive the colouring particles, which particles are afterwards detained by the contraction of the pores occasioned by cold; and further, that these pores are lined with a saline crust of tartar or vitriolated tartar.

On this theory the translator of the Chemical Dictionary has the following observations. "Mr Hellot has not shown that pure fixed alkali is incapable of producing the effects which he attributes to his tartar and vitriolated tartar; and both these salts, though they are difficult of solution, and require a great quantity of water for this purpose, will yet dissolve at last; and therefore, if the colouring particles were fixed chiefly by means of these salts, they might be washed out by a large quantity of water; which we find to be contrary to experience."

"We shall find it more difficult to substitute a true theory than to refute that of Mr Hellot. Many experiments ought to be previously made. Nevertheless, it may be observed, That the colorific particles of most substances used in dyeing seem to be insoluble in water, in spirit of wine, and even in alkaline liquors; that their diffusion through these liquids is caused merely by their adhesion to certain gummy and resinous particles: and that they may be detached from those gummy and resinous matters, by applying a piece of fluff to which they have a greater adhesive power, which seems to be the case of the root-coloured and blue dyes; or by applying another substance to which these particles have a greater power of adhesion; such as the earth of alum, in those dyes where that salt is used, together with some other substance, as fixed or volatile alkali, capable of decomposing alum, or as the ferruginous earth of the green vitriol in black dyes, to which the colorific particles of the galls adhere; which earths are capable of applying themselves and of adhering to the fluffs. The separation of the colouring particles from the gummy and resinous matters is probably facilitated by the addition of acids and neutral salts, which may coagulate in some measure the vegetable matters, and leave the colorific particles disengaged; so that they may apply themselves to the fluff, or to the earths abovementioned."

In a treatise on this subject by M. de Apligny, the M. de Ap.

ture of the different substances usually subjected to ligny's sho.

This operation is particularly considered. There are oily

wool, silk, cotton, and linen. Wool was probably the first substance to which any kind of and cotton were

applied, and which probably have been done even in the fleece, while mankind, in their rude state, wore the skins of animals. When some further progress in arts was made, and the method of manufacturing wool into worsted and cloth discovered, the dye would then be applied to it; but it was not till a considerable time afterwards that silk and cotton were known; and the art of dyeing linen is mentioned as a new invention even in the time of Pliny.

Wool, according to our author, consists of tubes, which, like hair, contain a medullary substance, but throughout their length are fives with an infinite number of lateral pores; and in proportion to the greater or lesser number of these pores, the woody fibres are more or less curled. The reason assigned for this is, that "the more interruptions there are in the continuity of any body, the more flexible it will be: the fibres of the wool therefore being curled must have many
DYEING.

many pores, and consequently great room for the extraneous substance which may be not only lodged in the exterior pores, but even penetrate into the whole extent of the tubes, after the medullary substance has been expelled. It is not therefore to be wondered at, if wool, being of all substances that are made into stuffs the most porous, should be the most easy to dye, and imbibe the greatest quantity of colour.  

Silk, according to our author, may naturally be supposed to proceed originally from the mucilage of the mulberry leaf on which the animal feeds, and which he imagines is converted into an animal substance by a combination with volatile alkali; but which, by the evaporation of a thin oil, and part of this alkaline matter, becomes tough and hard. An example of something similar to this is observed on the leaves of the rose, on which there are found tiny drops, which being touched while the fun shines upon it may be drawn out into fine and very white threads. The consolidation of the silk is also promoted by a yellow substance with which the animal impregnates the thread; and this seems to be a concrete oil something similar to wax. Silk thread therefore is nothing else than a continued series of molecules of this indurated gluten; but as in this defecation the molecule will remain at unequal distances, there will necessarily be inequalities, and consequently pores in the thread; but as these pores are only on the surface of the thread without any interior concavity as in the wool, it follows, that silk can admit no particles into its pores, but such as are extremely subtle and in very small quantities; that even the particles admitted require a stronger mastic or fixing substance than wool, since they are only superficial, and incapable of penetrating. Hence silk is much more difficult to dye permanently than wool, and requires likewise a much greater quantity of colouring materials; two ounces and a half of cochineal being required to give the same shade to a pound of silk that one ounce will give to a pound of wool. For the same reason also the colours on silk are less permanent than on wool.

Cotton being a true vegetable substance must necessarily have its fibres hollow like wool, that the juices may circulate properly; but as these are a great deal finer, the cotton is therefore much more difficult to dye. The exterior and lateral pores of cotton are likewise filled with a kind of oil, which it is necessary to expel before the dye can be given.

Flax may likewise be suppos’d porous, but that its pores are much smaller than those of any of the substances already mentioned. The detached and separated fibres resemble silk in some degree, only that, being more dry and compact, they take the dye with still more difficulty than even cotton; and from the different textures of these substances we may reasonably ascribe the different shades which are taken by them even when the same dyeing ingredients are made use of. This holds good also with respect to stuffs differently manufactured, though of the same kind; the pores being necessarily contracted by certain kinds of fabrication, whence they receive a smaller quantity of the dye: and hence scarlet cloth, when cut, appears white internally, the colouring atoms being too large to penetrate it, which, however, does not happen in the stuffs which have been previously dipped in solution of alum. — A difference of shade will also be occasioned by the different positions and delicacy of the fibres of the stuff; and by this also a difference is made in the brightness of the colour.

With regard to the operation of those substances commonly made use of for fixing the dye, our author, in his remarks, that lime seems defirable by the Author of nature for binding and uniting the two seemingly opposite substances of salts and earth. "Fire (says he) makes it soluble in water, and therefore cally used; but it again becomes indifferible by the contact and influence of the air; and these properties render it capable of forming, when united to other bodies, an unalterable cement." We know several mixtures of this kind, of which lime is the basis, and that in consequence of these properties it confirms the solidity of many colours.

Alum has the property of attracting the colouring particles of the dye as well as of fixing them; and Pliny informs us that this property was known to the ancients. They made use of certain earths of the argillaceous kind, which they called creta argentinaria, faludia, and anularia, to imbibe the colour from infusions of dyeing ingredients; and they became much sooner saturated with the colour than wool itself. There are two kinds of alum made use of in dyeing, viz. rock alum and Roman alum. The first is always used for blacks and the colours inclining to black; but as this generally contains some particles of iron, the Roman alum is preferred for the more lively colours, as it contains nothing capable of tarnishing their beauty. The colours are brightened by the whiteness of the earth while its tenacity, produced by some kind of unctuity with which it is combined, makes it more solid; and the plastic quality of the earth makes it take the form of the pores in the substance to be dyed; whence a greater permanency of colour must necessarily ensue.

There are several other saline substances made use of in dyeing, particularly nitre, sea-salt, sal ammoniac, and tartar, &c. By the three first the red colours are always rendered more dark-coloured, while the others enliven the colour and give it an orange hue. Neutral salts with a metallic basis serve to strengthen the colour, which varies its shade according to the nature of the metallic substance with which it is combined. Green and blue vitriol are the most commonly used in this art.

In explaining the theory of the art of dyeing, our Dyeing author considers the whole as an effect of attraction; and in order to set forth this matter in a proper light it is necessary, in the first place, to explain the conditions requisite for the action of bodies upon one another in this way. These conditions are: 1. That the attractive power be mutual in both. 2. That they should be placed at a distance from each other proportioned to the force of attraction. 3. That this force be superior to that by which the colouring matter is attracted by the water. Hence it is necessary for dyeing stuffs of any kind, that the dye should consist of small particles suspended in a liquid, in such a manner that they may be separated by a substance which has a greater affinity with these minute bodies than water. Some of these substances, however, are not attracted by the earth of alum, and these enter the pores of the cloth without its assistance; but in such as require the assistance of alum, the particles are fixed by the power of attraction, at the same time that the acid of the alum
The colouring matter becomes more rarefied, and reflects a greater number of the rays of light; whence it necessarily acquires a colour nearly yellow, and even quite so if a proper quantity be added; this being, according to our author, of all colours the nearest to white or transparency. Hence it is not customary for dyers to make any use of fixed alkali when cochineal is the colouring substance, as it would make too great an alteration in the consistence, and, by mixing with the animal oil, form a soaf which would render the colour mísible in water, and consequently the false kind of dye; the oil already mixed with fixed alkali being no longer at liberty to combine with the earth of alum. But after the substance has been already dyed, the fixed alkali may then be used with advantage in some cases; because the colouring substance being already converted into what our author calls a mastic, cannot be dissolved by the menstruum unless the latter be used in very great quantity.

Acids, according to M. de Apligny, are more destructive in their action than alkalies; and the oil of vitriol, formerly used, always containing some ferruginous particles, a kind of Prussian blue was formed, which rendered the colour purple rather than otherwise; and even by simple boiling in an iron vessel, the solvation of cochineal always affumes a purple colour. The activity of spirit of nitre, which has been substituted in place of oil of vitriol, is so great, that it has been found necessary to give it a basis on which it might in part exhaust itself, and, by communicating part of its phlogiston, render it less greedy of the cochineal. This basis is tin, which formerly was dissolved by spirit of nitre, but now by aqua regia, which was found to dissolve it more completely. Our author's method of using this solution, however, is not by diluting it in water, and then by dipping the stuffs in it previous to their being dyed. "This preparation (says he) would not be sufficient; for by diluting with a great quantity of water, a part of the calx would precipitate and be reduced into particles larger than when dissolved in acids, especially if used alone and separate from the dye; the acid in that case not acting on the colour with sufficient force to enliven it. Only part of this solution, therefore, is added to the cochineal liquor; and the acid then abandoning the tin, and combining with the oil of the cochineal, the calx of the metal feizes the colouring matter as it precipitates, and, as Mr. Hellot observes, forms a kind of lacker which infinuates into the pores of the stuff, and is there retained by a gluten given by the farth which was added to the dyeing liquor. Hence it is easy to conceive why the scarlet dye is much less solid than the crimson; the lacker being much drier than the simple colouring particles of the cochineal, is in this state nearer to the nature of the mineral colours. The oil and the animal gluten, which in the crimson dye form with the earth of alum a mastic, are destroyed by the acid, and the farth then added is an insufficient substitute."

The same thing that has here been mentioned of cochineal, applies equally to gum-lac and kermes; both of which afford a scarlet dye. The kermes he thinks, has the advantage of being composed of finer particles, which more easily penetrate the pores of silk or cotton. Silk indeed, on account of the smallness of its pores, takes up only a part of the cochineal; but it extracts the

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D Y E I N G.

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Our author next proceeds to contest the theory, that facts, even such as are the most infoluble, can maintain their stability in the pores of the stuff; however infoluble the fact may be in water. He observes that this infolubility, however great, could not prevent a great quantity of it from being carried off by water, and consequently the colour from being injured by the decomposition of these facts: but fixed earth, such as that of lime and alum, which from its nature obliquely retains the phlogistic principles of all colours, must necessarily produce such as cannot be destroyed but by the strongest acids.

Colours in the opinion of our author, depend entirely upon phlogiston. It is well known that, by the simple addition of any fact to an oily, vegetable, and colouring substance, we may either change or totally expel its colour; because any fact, either simple or compound, destroying the combination then subsisting, a new reflection of the rays of light must necessarily take place. In such substances therefore as cannot have their colour affected by any fact, the phlogiston is most probably in the most perfect combination with the other principles. Were we thoroughly acquainted with this combination, we should be able to make perfect compositions for dyeing, similar to what artificial cinnabar is for painting; but though we certainly know the effects produced upon some kinds of oils by facts, and can decompose some colouring substances and separate their principles, we are still unacquainted with the manner in which these principles are combined; and therefore every effort of this kind has hitherto been found insufficient for the purpose.

"As the colour (says our author) depends upon the shape or figure of the constituent particles of the colouring bodies, the shade may be varied by changing their figure, but the permanency of the colour is at the same time diminished; because it is impossible to produce this change without altering the principles to which they owe their permanency; and this is the case with cochineal. The shades of its colour are easily varied by acids and alkalies."

M. de Apligny then proceeds to account for the action of acids and alkalies upon colouring substances. Cochineal is rendered darker by alkalies, and always becomes of a deep purple on adding them; and the volatile alkali is found to be more efficacious in this effect than the fixed kind. These facts he supposes to produce this effect, because they are natural solvents of animal substances; which, however, they are incapable of dissolving without combination, causing only a composition without the disjunction of any principle. This combination gives a degree of density to the colouring particles which they had not before; and thus inclines them to black, by occasioning a greater degree of refraction in the pencils of rays. Acids, on the other hand, especially those of the mineral kind, burn the oil, and absorb the phlogiston, which is the principle of all colours. By the violence of their action a part of the phlogiston and volatile alkali evaporates, the colouring matter becomes more rarefied, and reflects a greater number of the rays of light; whence it necessarily acquires a colour nearly yellow, and even quite so if a proper quantity be added; this being, according to our author, of all colours the nearest to white or transparency. Hence it is not customary for dyers to make any use of fixed alkali when cochineal is the colouring substance, as it would make too great an alteration in the consistence, and, by mixing with the animal oil, form a soaf which would render the colour mísible in water, and consequently the false kind of dye; the oil already mixed with fixed alkali being no longer at liberty to combine with the earth of alum. But after the substance has been already dyed, the fixed alkali may then be used with advantage in some cases; because the colouring substance being already converted into what our author calls a mastic, cannot be dissolved by the menstruum unless the latter be used in very great quantity.

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the whole of the colour from the cochineal, and the
colour is also more fixed, probably because the shrub
on which the insect is nourished communicates its
affinities, or contains a greater quantity of oil. Cotton
may likewise be dyed with kermes, though cochineal
cannot penetrate its pores.

But in whatever way the farts used in dyeing do
act, it is certain they are capable, except in a very few
instances, of fixing and giving a lustrous permanency
to the colour which otherwise would never be obtained.

The exception to this general rule most commonly
known is that of indigo. This is a fine blue fcurca
produced by fermentation from the leaves of the In-
dian plant called anil. It is very difficult of solution;
however, it may be dissolved by alkaline farts, concent-
trated oil of vitriol, orpiment, or combinations of sul-
phur with quicklime. If a quantity of indigo is dis-
folved in a fixed alkali (for volatile alkalis will not
dissolve it), the solutio is always green, which is the
natural colour produced in all vegetable blues by the
alkali; but if any piece of fluff is put into this solution,
though it remains green while immersed in the liquid,
the moment it comes in contact with the air, the dis-
solving power of the alkali is totally destroyed; the
indigo is precipitated upon the cloth, refurnes its native
colour, and dyes the cloth blue.

The cause of this precipitation is very difficult to be
investigated. Perhaps it may be owing to an attrac-
tion of fixed air by the alkali from the atmosphere,
which renders the falt unable to dissolve the
indigo any longer. The adhesion of the colour seems
merely owing to an attraction between it and the cloth;
for the alkaline falt can contribute nothing to this, but
would rather have the contrary effect. Perhaps, how-
ever, the great solvent power posseffed by alkaline farts,
by perfectly clearing away every kind of fordes, may
bring the indigo and cloth into nearer contact with
each other, than when it is dissolved in any other way;
and consequently the attraction will in these cases be
the stronger. This seems to have some probability;
for when indigo is dissolved in vitriolic acid, as in
dyeing Saxon blue, the colour is much more easily dis-
charged.

Another exception is in the juices of some vegeta-
tables, such as the nuts of the anacardium. This pro-
duces, without addition, a most deep and lasting black,
ever to be washed out or discharged by any means
whatever. Several other plants are to be found in dif-
fent parts of the world, which give an indelible black
stain upon linen without addition; and the colouring
matter of these seems to adhere by means of a very
tenacious gluten, with which it is mixed, and which
when once thoroughly dried, can never be again dis-
folved. In this respect, these black staining colours
seem analogous to the purpura of the ancients; which
stained indelibly without addition, and was of an ex-
ceedingly vicious and adhesive nature.

Sect. II. Practice of Dyeing.

The materials for dyeing different colours are so
to many and various, that an enumeration of them all is
fearce to be expected. The fame difference, however,
takes place among the materials for dyeing which we
have observed to take place among those for Colour-

Making. Some ingredients produce durable colours,
which cannot be discharged either by exposure to the
true and air or by washing with soap: others, though they
may be made to stand the action of soap pretty well,
cannot by any means be enabled to retain the action of
the air. These are distinguished by the different names
of true and false, permanent and fading, &c.: nor is
there any method yet discovered of giving the false
colours an equal degree of durability with the true ones.
This hath been attempted by mixing a permanent and
a fading colour together; in which case it was thought
that the former would impart somewhat of its durabi-
ity to the latter: but this hath always been found to
misgive: the fading colour soon flying off, and leaving
the permanent one behind. Nay, in many cases this
does not even happen; for, by some means, hitherto
accounted for, the volatile colour imparts its volatility to
that which would otherwise be permanent. The fame
hath also been attempted by dyeing a piece of stuff par-
tially with a fading colour, and then completing the dye
with a permanent one. In this case it was hoped that the
fading colour being covered over with the permanent,
the injuries of the air by the permanent one, would ne-
cessarily become equally durable, or at least remain
a much longer time than if the stuff was dyed with it
alone. But this also hath been found ineffectual; and
the fading colour hath been diffipated as soon when co-
vered with a permanent one, as when left without any
such cover.---Solution of tin in aqua regia will give
most of these fading colours a high degree of beauty,
and some share of durability, though even that is not
able to make them equal to the others.---The most
permanent dyes we have are cochineal and gum lac for
fine reds and scarlets; indigo and woad for blue; and
when mixed in different proportions with cochineal or
lac, for purple and violet colours. Woad, and some
other vegetables, for yellow; and madder for coarse
reds, purples, and blacks.---The fading colours are
much more numerous. In this class are included Bra-
zil-wood, logwood, peach-wood, red-wood, fufi fie,
turmeric root, annatto, archil, &c. &c.

With regard to the farts made use of in dyeing, it farts to be
hath been, but too often customary to jumble together fuch in a quntity of different ones, that it was not only
impossible to know in what particular fart the virtue
rred, but often the efficacy of the whole hath been
totally destroyed, and the colour entirely spoiled by
fuch injudicious management. It is proper, therefore,
where a mixture of two or more farts is intended to be
made for dyeing, to try the change of colour pro-
duced by each of the farts upon the colouring fubftance.
If the colours are nearly alike, the mixture may be safely
made as to that particular. But if the two colours
produced by the different farts are very different from
one another, to mix them together must be very injudica-
tious. Thus, fuppose you want to dye carlet, folution
of tin in aqua regia produces the neceffary change of colour on the decoction of cochineal, and
converts it into a high flame-colour, which shows it to
be a proper ingredient; but to the solution of tin, it
would lurely be the greatest absurdity to add a quanti-
ty of faccharum furum, the effect of which is to change
the colour of cochineal to a dull purple. But though
the farts taken separately should produce a colour nearly
similar, anotherthing must be regarded, namely, whe-
that they can be mixed with safety to one another? It is the nature of many salts to destroy one another whenever they come into perfect contact by being dissolved in water. Thus, solution of tin and facet amon friatur-ni destroy one another; and so do solution of tin and tartar or cream of tartar. To mix these together must therefore be absurd; and yet we find this last mixture ordered in almost every receipt for dyeing scarlet. It is also to be observed, that a mixture of different salts ought never to be made, out of a single salt. For that the colour will keep the better on that account; a single salt will answer for this purpose better than a mixture should only be made where it is necessary to produce the colour desired; and if a dyer proceeds in this simple manner, he may not only attain to great perfection in the art from his own experience without being taught by others, but even make considerable discoveries; as dyeing is at present far enough from being brought to perfection.—The salts chiefly to be used in dyeing are fixed alkalies; solutions of tin in the vitriolic and marine acids, and in aqua regia; sugar of lead; cream of tartar; alum; oil of vitriol; and solution of iron in the acetic acid. By means of these, almost all kinds of colours may be dyed at an easy rate, and with very little trouble.

With regard to the operative part of this business, M. Heliot observes, that the whole depends on the use of some colours called by the workmen primitive, but which have no relation to the colours called primitive by Sir Isaac Newton. The primitive colours used by dyers are in number five, viz. blue, red, yellow, fawn or root colour, and black. Each of these furnish a great number of shades, both according to the nature of the ingredients themselves, and the acid or alkaline substances with which they are mixed. Of these five colours only two should be prepared with ingredients which produce no colour themselves, but which, by their acidity, and the fineness of the earth they contain, disperse the pores of the substance to receive the dye. Those colours which in a more particular manner require such a preparation are the red and yellow, with such others as are derived from them. Black requires a particular preparation; but blue and fawn colour none, at least for wool; it being sufficient for the purpose to pour and soak this substance well, after which nothing more is required than to plunge it into the vat, stirring it well about, and letting it remain for a longer or shorter time as the colour is intended to be more or less deep.

The ingredients used in dyeing blue are by our author determined to be three in number, viz. pastel, wood, and indigo. Pastel, called in Latin isatis or glaustum, is prepared by gathering it when it come to maturity, suffering it to rot, and then making it up into balls for drying. For this purpose it is cultivated in Languedoc, and is made up into balls of 150 or 200 pounds weight. These resemble a collection of little dry lumps of earth intermixed with fibres of plants. For extracting the colour, the dye must provide himself with large wooden vats of a magnitude proportioned to the quantity of fluff to be used. M. Heliot recommends them from ten to twelve feet in diameter, and six or seven in height. They should be made of flaves six inches broad and two inches thick, bound with iron hoops about two or three feet asunder. They are to be sunk in the ground for the more easy management of their contents, which is done by means of hooks fastened to the end of a staff, the length of which is proportioned to the diameter of the vat. The bottom is made of lime and cement, through it might be made of wood, were it not for the difficulty of getting a wooden bottom strong enough to support the weight. The vats used for dyeing cottons of a blue colour, as M. de Apligny informs us, are generally formed of large brandy pipes newly emptied, or of all hogheads containing about 500 quarts. Before the latter are made use of, they ought to be well cleaned, by skimming in them, and scrubbing with a broom till the oily matter is thoroughly dissolved by means of the lime.

The preparation of the blue vat is the most difficult operation in the whole art of dyeing; and for this our author gives the following directions: "Your copper cauldron should be placed as near as possible to the vat, and then filled with pond-water. If the water be not sufficiently putrid, you put in a handful of hay, viz. two or three pounds, with eight pounds of brown matter, or the bark of the root. If you could have the old liquor of a madder vat, it would save fresh matter, and have a better effect. The fire should be lighted about three in the morning, and the mixture should boil an hour and a quarter; though you continue the boiling for two hours and an half or three hours. The liquor is now to be conveyed into the vat by means of a spout, the vesel being very clean, and having a halfful of wheaten bran at the bottom. The pastel balls are to be put into the vat one after another while the liquor is running into it, that they may be more easily broken, stirred, and mixed with the rake, an instrument composed of a strong semicircular piece of wood, with a long wooden handle. The mixture should be continually stirred till all the hot liquor is emptied out of the copper into the vat; and when the latter is rather better than half full, it should be covered with a lid a little larger than the circumference. There should also be a cloth put over it, to confine the heat as much as possible; after which the whole should be allowed to remain four hours. It ought then to be uncovered, in order to mix it thoroughly, and to give it air. About a handful of lime ought now to be put in for every ball of pastel; and after flattering in this substance, the vat should again be mixed and covered as before, except about a hand breadth to let in the air. In four hours after it should again be stirred, but without giving it any more time; then it is to be covered and suffered to stand for three hours longer, leaving a small opening for air as before. At the end of three hours it may again be uncovered and well stirred; and if it be not yet ready and come to, according to the language of the dyers, that is, if the blue does not rise to the surface, but that it still foams, which may be known by striking with the flat of the rake, it will be necessary, after stirring it well, to let it stand an hour and a half longer, watching it carefully during that time in cafe it should set blue. You then supply it with more water till the vat is full, putting in as much indigo as you think proper.

"The indigo used for this purpose should be in solution; and in order to dissolve it you must have a separate
DYEING.

A lixivium being procured, the vessel sufficient for dissolving 80 or 100 pounds of indigo must contain 30 or 35 buckets of hard water. This should be made into a lixivium, by putting 25 buckets of clear water into the copper with the addition of a half-bau of bran, 12 or 13 pounds of madder, and 40 of good pot-ash; that is, half a pound of alkaline salt and two ounces and a half of madder to each pound of indigo. It should be boiled quickly for three quarters of an hour; after which the fire should be taken away from the furnace, and the residuum stand for half an hour, in order to let the sediment fall to the bottom. The clear liquor is then poured into a clean cask placed close to the copper. Take out the grounds at the bottom of the copper, wash it clean, return the lixivium into the copper, light a small fire under it, and at the same time put into the copper 80 pounds of indigo reduced to a gross powder. The liquor should then be made very hot, but not suffered to boil; and to facilitate the solution, it must be kept continually stirring with a small rake, to prevent it from gathering into lumps, or from burning to the bottom of the copper. The liquor should be kept moderately hot, and of as equal a degree of heat as possible, by throwing into it from time to time four ounces of lime, which should be at hand and ready prepared, in order to cool it. As soon as you perceive that there are no longer any lumps in the bottom of the copper, and that the indigo is well dissolved and diluted, the fire is to be withdrawn from the furnace, leaving only a few hot cinders to keep it warm. Cover up the copper then, and put it into a pattern of stuff which ought to be green when taken out, and turn blue immediately on being exposed to the air. Should this not be the case, some fresh and clear lixivium, prepared as just now directed, must be added.

In preparing the paste-vats, one common dye-house kettle full is to be put in for every ball of pastel; the vessel is then to be filled within six fingers breadth of the edge, when it is to be well mixed and covered as before.

An hour after the vat has been supplied with water, it must have two measures (about two handfuls) of lime for every ball of pastel, or in proportion as it is thought that it will be required; but some kinds of pastel require much less preparation than others, it is impossible to give any accurate directions upon the subject. In general, however, the lime should not be scattered in till the vat be well firred.

Having again covered the vat, a pattern is to be put in at the end of three hours, which should also be kept three hours immered in the liquor, when it is to be taken out, in order to examine the state of the vat. The pattern, as has already been observed, ought to be green when immediately taken out, but faintly to turn blue; and if it is of a good green, you fir the vat, adding one or two handfuls of lime, and then cover it. Three hours afterwards it is to be firred again, adding more lime if necessary. Cover it then for an hour and a half longer; and when the matter is settled, immerse a pattern, which must remain for an hour, and then be inspected to know the state of the pastel. If the pattern be of a good green when taken out, and becomes a deep blue when exposed to the air, another pattern is to be put in, in order to ascertain the effect of the vat. Should the colour of the pattern be sufficiently high, the vat is to be filled with hot water, or, if it can be procured, the liquor of an old madder vat, and then firred again. If the vat wants lime, a sufficient quantity must be added according to the smell, and it may be found necessary during the working. This being done, and the vat brought to a proper state, it is to be once more covered for an hour; after which the stuff are to be immered in it.

This operation is supposed by some dyers to be impracticable, except upon a very large scale; but M. Hellot has made some experiments on this subject, which seem to evince the contrary. For this purpose he took a little barrel containing about 25 gallons, and put it into a copper full of water kept carefully heated. He then put 20 gallons of water into a small copper with an ounce and an half of madder, and a very small handful of dyer’s weed; which last, however, he does not suppose to be of any use. Having made the whole to boil together for three hours, he poured all the liquor into the barrel about nine in the evening, previously putting into it two small handfuls of brain. At the same time he added four pounds of pastel; and having firred it well for a quarter of an hour, he covered it up, and took care to have it firred every three hours during the night. It is customary to put some four gallons of water into the large vats, but this was omitted in the present case; and the brain, which was found to be a sufficient substitute. Next morning the mixture was found to be in a state of fermentation, frothing up and making an hisling noise. On mixing it well, and adding an ounce and an half of flaked lime, the froth was increased, and as the stuff becamefirrer, it was judged proper to add a little more pastel. At half an hour after ten the vat became firrer of the lime; a pattern was put into it; and at the expiration of an hour, it was taken out green; and which, on being exposed to the air, became blue. On being firred, another pattern was put in about an hour afterwards; which having also remained an hour immersed in the liquor, came out afterwards of a deeper blue than the former. At half an hour after twelve, two ounces of indigo, not dissold, but only powdered, sifted and diluted with hot water, were put in, with about the bigness of a walnut of the cendres gravelles or burnt lees of wine, which contain a large quantity of alkaline salt; and every two hours afterwards a pattern was put in an hour after firring the vat, letting each alo remain an hour in the liquor. This was continued till ten o’clock and the last patterns were not only evidently darkett, but of the brightest colour.

The last pattern showed that the lime was exhausted; but on account of the lateness of the hour, our author added only another half ounce of lime, and an hour after put in another pattern; which after having remained an hour in the liquor, was taken out more blue than the rest, though the colour had been rendered less lively by the lime. Two other patterns put in during the night were still darker, though the colour was somewhat dull; an evidence that the lime was not yet exhausted. The paste which lay at the bottom was of a yellowish brown when taken out, but by exposure to the air became of an olive green. Under the surface it appeared of the same colour if moved with the hand, but instantly became green, smelling rather strong, though not very much of the lime. The liquor itself
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Itself was of the colour of beer, but the scum or froth of a blue colour. Patterns were now put in every two hours till two in the afternoon; when that which was taken out appeared of such a fine blue, that it was judged proper to fill the vat. For this purpose about eight gallons of water were put into a little copper with a quarter of an ounce of madder and a handful of bran; and when it had boiled for half an hour, the liquor was put into the little vat for three hours. On stirring and letting it then remain for an hour afterwards, a pattern was put in, which in an hour’s time was taken out of a beautiful blue. An ell of sarge was then immersed by means of what our author calls a crof; which is an iron hoop with a net fastened to it, the meshes of which are about an inch square; and the whole may be suspended at any height required by means of three or four cords fastened to it. The sarge had no other preparation than being made thoroughly wet; nevertheless, in about a quarter of an hour it was taken out very green, and on being wrung out turned blue, but on a second immersion for another quarter of an hour the colour turned out much more lively and brighter than could have been expected. The experiment was repeated with a pound of worsted; but the vat had been so much exhausted that it came out only a dkye blue; however, by sprinkling in about half an ounce of fresh lime, the colour was afterwards made sufficiently deep.

For setting this vat our author gives the following directions. 1. It is in a proper state for working, i.e. for imparting the blue colour to the stuffs put into it, when the sediment or grounds at the bottom is of a fine brown green; when it changes upon being taken out of the vat; when the froth which rises to the top is of a fine Persian blue; and when the pattern, which had been steeped for an hour, is of a fine green colour. 2. The vat is also in a proper state for working when the liquor is clear and reddish, and the drops which adhere to the rakes are of a brown colour. 3. When the liquor is neither harsh nor tinged grey to the feel, and when it smells neither of lime nor of the lixivium. 4. It may be known when too much lime has been put in, by the colour of the pattern immersed in the liquor; which, instead of being a fine grays green, will be only a dirty greyish blue, or some other colour of that kind. The same thing may likewise be understood when the sediment does not change colour; when there is scarce any efflorescence on the vat; and when the liquor smells only of lime or lixivium.

In order to rectify the state of the vat in this case, several methods have been recommended by practical dyers. 1. Some use tartar or bran, adding a quantity of either as occasion may require. 2. Others attempt to correct it by throwing in a bucket of urine. 3. Sometimes they use a large iron stove, which may reach from the grounds at the bottom to the top of the vat. This machine is furnished with a grate about a foot from the bottom, and an iron tunnel, one end of which commences with the grate, and communicates with the external air. On forcing down the stove to the bottom of the vat, where it ought to be retained by iron bars, the heat of the stove will force up the lime to the top, where as much as is required may be taken out by the stove. 4. Some dyers correct a vat which has got too much lime with urine and tartar: but the best method, according to our author, is to put into it a sufficient quantity of bran and madder; and if the excess of lime is not very great, it may be allowed to stand four, five, or six hours, or more, adding to it two handfuls of bran and three or four pounds of madder, which should be slightly sprinkled on the top without any covering. At the end of four or five hours it should then be stirred by a rake, and a pattern put in to try the effect of it. If the blue does not rise until it is cold, it ought to have time to recover, by allowing it to stand without disturbance, which sometimes requires whole days to accomplish; but, in general, the lime which seems to want strength to carry on the fermentation, revives and prevents the vat for some time from yielding any colour. To bring it forward, some bran and madder should be sprinkled on the top, besides an addition of two full baskets of fresh paste, which affixes the liquor, when heated again, in dissolving the lime. 5. The vat ought now to be frequently tried by putting in a pattern, that from one hour to another you may be able to judge by the green colour how far the lime has operated. Thus the operation may be accurately conducted; for when the vat has suffered either by too much or too little lime, it is very difficult to manage it. 6. If, during the time that you are thus employed in retrieving the vat, it should cool too fast, you must endeavor to preserve the heat by emptying some of the liquor, and replacing it with hot water; for when the liquor grows cold, neither the paste nor lime are confumed but in a very small quantity. The action of the lime is also retarded by too great a degree of heat; and in this case it is proper rather to wait a little than to be in too great a hurry to restore the vats. 7. It is evident that the vat has suffered by not being sufficiently supplied with lime, when there are no large air bubbles on the top of a fine blue colour, but only a fetted froth of small tarnished bubbles; and when, by dashing upon the surface of it with the rake, it makes a hissing noise produced by the bursting of a vast number of these small air-bubbles as soon as they are formed. The liquor has also an offensive smell like rotten eggs, and the sediment does not change colour when taken out of the liquor. This accident will very probably take place, if you do not carefully attend to the smell of the vat, but imprudently put in the stuffs when the paste has spent the lime; for in that case the small quantity of lime which remains will adhere to the stuffs, and will thus give them a bad colour. When this is perceived, you must immediately take them out, and add three or four handfuls of lime in proportion to what you suppose the vat has suffered, but without stirring it up from the bottom. On stirring the vat you ought to attend to the noise as well as to the smell; for if the hissing ceases, and the bad smell is also removed, there are great hopes that the liquor only has suffered, and that the paste is not impoverished. But when the liquor smells of lime, and is soft to the feel, the vat is then to be covered, and allowed to settle for an hour and a half; after which period, if the efflorescence commences, a pattern is to be put in, and the subsequent process is to be regulated by the colour it assumes. Some are of an opinion that the paste blue is much superior.
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Superior to that obtained with a mixture of indigo; but it is undoubtedly much dearer, as yielding a much smaller quantity of colour; and from the experiments of M. du Fay, as well as of our author on this subject, it appears that the prejudice in favour of pastel is by no means well founded. When a vat has been heated and well worked two or three times, the same colour is frequently preferred, only taking out part of the sediment, and supplying it with fresh pastel; but for this no directions can be given, as it is evident that the whole must be regulated by the practice of the dyer. Some are accustomed to allow the same liquor to remain for years in their vats, only supplying it with ingredients from time to time; but this practice seems not to meet our author's approbation, who thinks it rational to suppose that the bell colours will be made by emptying the vats entirely when they have been heated six or seven times, and ceafe to give any more colour.

With regard to the reheating of the pastel vats, our author further observes, that if you heat a vat when it is exhausted, viz. when deficient in lime, it will imperceptibly turn in such a manner as to be in danger of being spoiled; because the lime, already too much diminished, will be entirely consumed by evaporation. The only remedy, if discovered in time, is to throw it back into the vat, to supply it with lime, and then wait till it recovers before you reheat. In this operation also care should be taken to put the grounds into the copper with the liquor; and it must not be allowed to boil, otherwise some of the more volatile parts necessary for producing a good colour will be evaporated. Some do not put the indigo into the vat until some hours after the liquor has been emptied out of the copper, and the mixture begins to recover itself. This precaution is taken lest the vat should not recover, and then the indigo would be lost. An inconvenience, however, arises from this practice, viz. that the indigo does not give out its colour freely; so that it is best to put it into the vat immediately with the liquor, and to stir it well afterwards. If a vat that has not been worked is to be reheated, it must not be skimmed as in the common operations of this kind; for then the indigo would be skimmed off; but in ordinary cafes the fcum is composed of the earthy particles of the indigo and pastel, with a small quantity of lime. When too much lime is added, you must wait till it be confumed. It might indeed be corrected by an addition of acid or other ingredients; but as these also confume the colour, it is better to wait the natural operation of the lime itself. Weak lime proves likewise disadvantageous, because it remains in the liquor without incorporating with the paste. When this is the case, the paste smells strong, and the liquor has a kind of sweetchrift smell; but both ought to be alike in this respect. The remedy is to haften the solution by stirring it often in order to mix the lime with the paste, till the proper smell of the vat be restored, and the froth on the surface becomes blue.

To slack lime for the purpose of dyeing, several pieces are to be thrown into water one after another, taking out each piece when it begins to ferment, and putting in another. It is then put into an empty copper or other vessel; and when fallen thoroughly into powder, it is to be sifted through a fine sieve, and kept in a very dry closet.

In this operation acid waters are sometimes necessary; the method of preparing which is as follows: pound of acid
Fill a copper of any size with river water; put fire waters.
under it; and when it boils, throw it into a cauldron in which you had before put a sufficient quantity of bran. It should be well stirred three or four times a-day. Three bushels of bran into a vessel containing about 70 gallons of water have been found to answer the purpose. This water, at the end of four or five days, becomes acid; and therefore may be applied in all cafes where it does not injure the preparation of the work. It must be observed, however, that woolen fhee, by too great a quantity of acid liquid, would be rendered difficult to spin, as being in a manner glued together by the matter proceeding from the bran. It is also necessary to take notice, that the acid must not be left in the cauldron, especially if this is made of copper, because it will corrode enough of the metal to occasion a deficiency in the colour. This metal, when disloved gives a greenish colour.

The Dutch vats are constructed in such a manner as to require less frequent heating than those above described. The upper part of them for three feet down,ward is of copper, and they are almost surrounded by a brick wall at about the distance of six or seven inches from the metal. A quantity of hot embers are deposited in this interval, which maintain the heat of the vat fo effectually, that it remains for several days in a state fit for working even after it becomes very weak. This is not the case with the others, which frequently give a much deeper colour than was intended, unless you suffer them to grow considerably colder; and in that case the colour is less bright.

The woad-vat differs from that already described of the only in being weaker and yielding less colour; but it woad-vat. is prepared in the same manner. The following is a description of the woad-vat, according to an experiment made by M. Heliot, similar to that concerning the pastel already mentioned.

"I placed (says he) in a cauldron a small cafc containing about twelve gallons, two-thirds full of river-water, an ounce of madder, and a small quantity of weld; at the same time I put into the cauld a good handful of bran and five pounds of woad. At five o'clock in the evening the vat was well stirred and covered. It was again stirred at seven, at nine, at twelve, at two, and at four. The woad was then working, as has been already observed with regard to the pastel. Some air bubbles began to rise pretty large, but in a small quantity, and of a very faint colour. It was then garnished with two ounces of lime, and stirred. At five o'clock I put in a pattern which I took out at six, and again stirred. This pattern had received some colour. At seven o'clock I put in another, and at eight stirred again. This pattern was tolerably bright: I then added an ounce of indigo; at nine o'clock another pattern; at ten stirred again, and put in an ounce of lime because it began to smell sweetchrift; at eleven another pattern, and at twelve stirred again. This process was continued till five o'clock. I then added three ounces of indigo. At six I tried another pattern, and at seven stirred again. It would have been now time to fill it, being in a proper state for the
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for working, as the last pattern which had been taken out very green became a bright blue: but as I was very much fatigued, having sat up the whole night, I chose to defer it till the next day, in order to see its effect by day-light; and for this reason I added an ounce of lime, sufficient to fashion it till nine o'clock in the morning. Patterns were put in from time to time; and the least being very beautiful, I filled the vat with a liquor composed of water and a small handful of bran only. It was then stirred, and patterns tried every hour. Being in a proper state at five o'clock, it was immediately worked. It was then garnished with lime, and mixed, in order to preserve it till such time as it might be convenient to reheat.

"Two months afterwards I prepared another wood vat without indigo, that I might be enabled to judge of the solidity of the dye; and was convinced, by experiment, that it was of equal goodness with the pail. Hence the pail is superior to the wood, only because the latter yields less colour than the other.

"The little variations to be observed in the method of setting these different vats, sufficiently demonstrate that there are many circumstances in the several processes not absolutely necessary. In my opinion, the only matter of importance, and which demands attention, is to conduct the fermentation with caution, and to avoid supplying with lime till, from the indications I have described, it appears necessary. With regard to the indigo, whether it be added at twice or all at once, whether a little sooner or a little later, is, I think, of very little importance. The fame may be said of the wood, which I used twice, and twice omitted; and likewise of the pearl-ash, a little of which I put into the small pail vat, and omitted in that of the wood. In short, it appears to me very demonstrable, that the distribution of the lime either in the setting or reheating the vats requires most attention. It must also be observed, that in setting either a pail or wood vat, it cannot be too frequently examined; because though some are too flow, which is attributed to the weakness of the pail or wood, others become too soon ready for working. I have seen seventy pounds of pail lost by this neglect. It was ready for working at eight o'clock, but for want of the workman's constant inspection, he did not stir it till two hours afterwards. The pail vat was then entirely rifed to the surface of the liquor, which remained very green. It was now impossible to recover it; he was therefore obliged to throw it out immediately, or it would very soon become unprofitably putrid and fecid.

"This difference in the vat may be also produced by the temperature of the air, as it cools much sooner in winter than in summer. It is therefore necessary to watch very attentively, though it is seldom fit for working in less than 14 or 15 hours.

"The indigo vat (says our author) is about five feet high, two feet in diameter, and grows narrower towards the bottom, being surrounded by a wall, and a vacancy left for the embers. In a vat of this size you may put from two to five or six pounds of indigo. In order to set a vat containing twenty gallons, you boil in a copper about fifteen gallons of river-water for half an hour, with two pounds of pot-ash, two ounces of madder, and a handful of bran. The indigo is prepared mean while in the following manner:

"Take two pounds of indigo, and put it into a pail of cold water, in order to separate the folid from the volatile particles, which will immediately rise to the surface. The water is then poured off; and the remaining indigo pounded in an iron mortar; you then put a little hot water into the mortar, shaking it from side to side, and pouring into another vessel that which swims, and which is consequently the best bruised. In this manner you continue to pour what remains in the mortar, still adding fresh water, in order to make the finest part rise to the surface, and so on till all the indigo is reduced to a powder to fine as to rise in the water, which is all the preparation required.

"The liquor which had boiled in the copper, with the grounds of the madder and pot-ash, which probably fell to the bottom, is thrown into the high narrow vat; at the same time adding the pounded indigo. The whole is then well stirred with a rake, the vat covered, and the embers put around it. If this operation was begun in the afternoon, you must renew the hot embers in the evening, which should also be repeated both morning and evening the next day: the vat should be lightly stirred twice the second day. In order to maintain the heat of the vat, you renew the embers on the third day, stirring the vat twice. You then perceive, that a thinning brassy ficum, divided and interrupted in many places, begins to rise on the surface. By continuing the heat, on the fourth day the ficum becomes more perfect and less broken. The froth that rises upon stirring is now blue, and the vart deep green."

"When it becomes green in this manner, it is an indication that the vat should be filled. For this purpose you must prepare a fresh liquor, by putting five gallons of water into a copper, a pound of pot-ash, and half an ounce of madder. When this has boiled a quarter of an hour, you fill the vat. You then stir it; and if it produces much froth, it will be in a proper state for working the next day. This is sufficiently known by the quantity of froth, and by the brassy sealy cruit that swims on the top of the liquor; also when, by blowing or stirring it with the hand, the liquor beneath is green, though the surface appears of a brown blue.

"This vat, of which I have just described the process, and the first I had set, was much longer in coming to a colour than the others, because the heat was too strong the second day; but for this accident, it would have been ready for working two days sooner. It was attended with no other bad consequence; and therefore, as soon as it was in a proper state for working, I dipped at several times 30 or 40 pounds of serge. As the liquor was by this means diminished and weakened, it was necessary in the afternoon to replenish with a fresh mixture, composed of a pound of pot-ash, half an ounce of madder, and a handful of bran. Having boiled this a quarter of an hour, it was put into the vat; which was then stirred, covered, and a few embers put round it. In this manner it may be kept for many days; but when you mean to work it, it should be stirred the preceding evening, and supplied with hot embers.

"When
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"When you would reheat this kind of vat, and replenish it with indigo, you put into a copper two-thirds of the liquor, now no longer green, but of a brown blue and almost black. When it is ready to boil, the scum on the top should be taken off with a sieve; after which it should be suffered to boil, with the addition of two handfuls of bran, a quarter of a pound of madder, and two pounds of pot-ash. The embers are then taken from under the copper, and a little cold water thrown in to stop the boiling. It is then emptied into the vat, with the addition of a pound of indigo pulverized and dissolved in some of the liquor, as I have said above. The vat being then filtered, covered, and a few hot embers put round it, will be fit for working the next day."

"When an indigo vat has been reheated several times, it should be emptied out entirely and let anew, because the colour becomes dull; for though heated, and in a proper state for working, the green colour is not so beautiful as at the beginning.

"I have had several other vats let in the same manner, with a greater or less quantity of indigo; as from one to six pounds, proportionally increasing or diminishing the other ingredients; always, however, putting a pound of pot-ash to a pound of indigo. From other experiments which I have since made, I am convinced that this proportion was not absolutely necessary. I am also persuaded that there are many other methods for the preparation of the indigo vat equally effectual. I shall nevertheless make some observations concerning this vat.

"Of all those which I have had prepared in this manner, I failed but in one; which was occasioned by neglecting to put hot embers round it on the second day. I added some pulverized arsene, but without any effect; it would never come to a colour. Red hot bricks were also thrown into it at several times; the liquor at times became greenish, but never sufficiently. At length, after having to no purpose tried several other means without being able to discover why it did not succeed, and having reheated it several times, I had it thrown out at the fortnight's end.

"The several other accidents which I met with in the conduct of the indigo vat only retarded the facts; so that this operation may be considered as very easy in comparison of the pastel or wood vat. I have indeed made several experiments on each of them, with an intent to shorten the time of the preparation; but for the most part not succeeding, or at least not better than by common practice, it is needless to describe them.

"The liquor of the indigo vat is not in every respect like that of the pastel. Its surface is a brown blue, covered with coppery scales, and the liquor itself of a fine green. The stuff or woollen which it dyes is green when taken out, and becomes blue immediately afterwards. The same observation has been made with regard to the pastel vat, but it is very singular that the liquor of the latter is not green, though it produces the same effect upon woollen as the other. It is also necessary to observe, that when the liquor of the indigo vat is changed out of the vessel, and too long exposed to the air, it loses its green colour, and at the same time all its qualities; so that, though it yields a blue colour, it is not permanent.

"There is likewise a cold preparation of an indigo Cold indigo vat with urine, and it is also worked cold. For this purpose, you take four pounds of indigo powdered, and put it into a gallon of vinegar, leaving it to digest over a slow fire for 24 hours. At the expiration of this time, if it be not perfectly dissolved, it is again pounded in a mortar with the liquor, adding now and then a little urine. You afterwards put into it half a pound of madder, mixing it well by stirring the whole with a stick. When this preparation is finifhed; you pour it into a cask containing 60 gallons of urine: it is of no consequence whether it is stale or fresh. You mix and stir the whole well together; and this should be repeated morning and evening during the space of eight days, or till the surface of the liquor becomes green when stirred, and produces froth like the common vats. It may be worked immediately without any other preparation than stirring it three or four hours before hand. This kind of vat is extremely convenient; because when it is once prepared, it remains so always till it is entirely exhausted, that is to say, till the indigo has yielded all its colour: hence it may be worked at all times, whereas a common vat must be prepared over night.

"According as you would have this vat more or less considerable, you augment or diminish the ingredients in proportion to your quantity of indigo: thus for every pound of indigo you always put a quart of vinegar; two ounces of madder, and fifteen gallons of urine. This vat is much sooner prepared in summer than in winter. If you would hasten it, you need only take a little of the liquor, heat it in a copper without suffering it to boil, and afterwards pour it into the vat. This operation is so very simple, that it is almost impossible it should fail.

"When the indigo is entirely exhausted, the vat may be renewed by dissolving some fresh indigo in vinegar; but you must add madder in proportion to the quantity of indigo, and then pour it into the vat, which should be stirred as at first, morning and evening; it will be as good as if it were fresh. This, however, should not be repeated more than four or five times; because the grounds of the madder and indigo would tarish the whole, which would confequently render the colour less bright. I must however confess, that as I have not myself experienced this vat, I cannot answer for its success; but the following with urine, which I have seen prepared, dyes woolens a very permanent blue.

"A pound of indigo was first steeped in a gallon of hot vat urine for 24 hours; it was afterwards ground in a large iron mortar with the same urine. When by this means the urine became very blue, it was strained through a fine sieve into a small tub; but the indigo which remained in the sieve was beaten again in the mortar with another gallon of fresh urine, and this was repeated till all the indigo passed through the sieve with the urine. This operation, which continued two hours, being finished, about four o'clock in the evening, 62 gallons of urine were put into a copper, which was made very hot, but without boiling; and the feum which rose on the surface of the urine was brushed off the copper.
with a before. This was frequently repeated till nothing rofe but a white fine scum. The urine being thus sufficiently purified and ready to boil, it was thrown into the wooden vat; the prepared indigo was then added, and the vat stirred with a rake, in order that the indigo should incorporate with the urine. Immediately afterwards a mixture, consisting of a gallon of urine, a pound of alum, and a pound of red tartar, was added to the vat; but these were first reduced to a fine powder. The urine was then poured out on it in the mortar, and mixed together till it ceased to ferment. It was then poured into the vat, well stirred, and covered. In this situation it was left all night. The next morning the liquor was very green. This showed that the vat was in a proper state, and that it might have been used; but it was suffered to remain without working, because all that had been hitherto done was only the first preparation of the vat, and the indigo which had been put into it was designed only to nourish and temper the urine. Hence the vat was suffered to rest two days in order to complete the preparation, but covered all the time to prevent it from cooling too fast. It was then managed as follows: A second pound of indigo was beaten with purified urine as above. About four o'clock in the afternoon the whole vat was emptied into the copper; it was then made very hot, but not boiled. It still produced a thick scum, which was taken off; and the liquor, being near boiling, was returned into the vat. The indigo was immediately added, bruised as above, with a pound of alum, a pound of tartar, and two quarts of urine, with the addition of another pound of madder: it was then stirred, close covered, and suffered to remain fo all night. The next morning it was in very good order; the liquor being very hot, and of a beautiful green: hence it was evidently in a proper state for dyeing; which was executed in the following manner. The substance to be dyed was woolen fleece.

This fleece had been well-scored with urine, well washed, and perfectly well drained. Being thus prepared, 30 pounds of it were put into the vat. It was then well opened with the hands, that it might be equally drenched; and after this it was suffered to remain an hour or two according to the degree of shade that was required. During this time the vat was kept close covered, in order to preserve the heat; for the hotter it is, the better it dies: when it becomes cold, it ceases to act. When the wool was sufficiently blue, it was taken out in large balls, as big as a man’s head; and at the same time squeezed and wrung over the vat, and immediately given to four or five women who stood round the vat, in order to open it, and expose it to the air between their hands till the green colour which it had coming out of the vat changed to blue. This change was produced in three or four minutes. These 30 pounds being thus dyed, the vat was raked, and then suffered to stand for two hours, keeping it always close covered. At the expiration of this time they put in another 30 pounds of wool, which was opened well with the hands. The vat was again covered; and in four or five hours this wool had taken as good a colour as the former: it was then taken out of the vat in balls in the same manner as the former. This operation being finished, the vat was still warm, but not sufficiently so to dye any more wool; for when it has not a sufficient degree of heat, the colour which it yields will be neither uniform nor solid: hence it is necessary to reheat and replenish with indigo as before. This may be done as often as you think proper; because this vat never spoils by age, provided that while it is kept idle you give it a little air.

About four o'clock in the afternoon all the liquor was emptied into the copper, with the addition of a sufficient quantity of urine to replace what had been evaporated and lost in the preceding work. This generally requires about eight or nine buckets of urine. The copper was then heated, the scum taken off as before: when ready to boil, it was returned into the wooden vat. You add to it a pound of indigo, pounded and mixed with urine as above, a pound of alum, a pound of tartar, a pound of madder, and two quarts of urine. After the vat is stirred and close covered, it is suffered to stand all night. It will be in a proper state the next day, and capable of dyeing 60 pounds of wool at twice, as above. In this manner, the reheating should be always done the day before you want to dye, and may be repeated ad infinitum.

It is necessary to observe, that the more indigo you put into the vat at once, the deeper the colour: thus instead of one pound, you may add four, five, or six, without increasing the quantity of alum, tartar, or madder; but if the vat contains more than three hogheads, the quantity of the ingredients should be proportionally augmented. That which I have just mentioned contained only three hogheads, and was consequently too small to dye at one time a sufficient quantity of wool to make a piece of cloth, viz. 55 or 60 pounds. To do this properly, it should contain five hogheads, which would be attended with a double advantage. First, all the wool might be dyed in two or three hours; whereas, by twice dipping, it could not be finished in less than eight or ten. Secondly, at the expiration of the three hours, the vat would be still very warm; so that, after stirring and letting it settle for a couple of hours, the same wool may be dipped again. By this means the colour is heightened almost as much more: because wool once dyed always takes a much better colour than new or white wool, though suffered to remain in the vat even for 20 hours.

It is necessary to be very attentive in opening the dried balls as soon as they are taken out of the vat, and exposing them to the air, in order to change them from green to blue, which should be done by many hands at the same time, that they may be equally affected by the air, else the blue colour will not be uniform.

Some manufacturers pretend that cloth, the wool of which had been dyed in this urine vat, cannot be perfectly scoured by fulling even at twice; others affirm the contrary, and I believe they are right. Nevertheless, if the first be right, one would suppose that the animal oil of the urine was become rancid by drying on the wool, or that incorporating with the oil by which the wool had been moistened for its other preparations, it would be more likely to resist the fuller’s earth and soap than simple oil by expression. To remedy this, it is only necessary to wash the wool
DYEING.

In running water after it has been dyed, expressed, and opened, ungreased, and again cold. Be this as it may, a pastel vat in a large dye-house is preferable to those kinds of indigo vats prepared with urine; because with a good wood-vat and a dexterous wood-man, you expedite more work than could be accomplished with any other blue vat. In mentioning the several indigo vats in this treatise, my design is not so much to introduce them to great manufactories, as to assist those who work at small fabrics; to whom, I flatter myself, this treatise will be equally useful. I will even describe a cold vat for the dyers of small fluffs mixed with thread or cotton, which succeeds very well, but which would be of no use for woollens.

"In some places they make use of a cold indigo vat, differing from that already mentioned, which is more commodious, as it is much sooner ready, and has no bad smell. It is prepared in the following manner.

"Three pounds of indigo well pulverized, is put into a glazed earthen vessel, and dissolved in three pints of soap-boiler's lixivium, which is a strong solution of fessile alkali with quicklime. I have made use of a solution of pot-ashe, and succeeded very well. The solution of indigo is performed in about 24 hours, as may be easily discovered by its remaining suspended in the liquor, which is thereby thickened, and becomes like an extract. At the same time you put into another vessel three pounds of slacked lime fitted with six quarts of water. The whole should boil during a quarter of an hour, and when settled should be drained off clear. You afterwards dissolve in this lime-water three pounds of green copperas, suffering it to settle till the next day. You then put 75 gallons of water into a large deal cask, the only wood proper for the purpose; as any other, particularly oak, would blacken and tarnish the liquor. The two solutions, which had been prepared the night before, are then added, the vat stirred, and left to settle. I have seen it sometimes take the colour in two hours; but with this vat it was very different, not being ready till very late the next day. It produces a great quantity of froth, and the liquor takes a fine green colour, but a little yellowish, something like the green of the common vat.

"When the vat is almost exhausted, it is replenished and quickened without fresh indigo, by adding to it a small liquor, consisting of two pounds of green copperas dissolved in a sufficient quantity of lime-water. But when the colour of the indigo is quite exhausted, it should be replenished with fresh indigo dissolved in a lixivium, such as I have just described. It is natural to suppose, that the quantity of your other ingredients must be augmented or diminished in proportion to the indigo. Some dyers use a mixture of vinegar and water impregnated with rusty iron. They suppose that the colour is thereby rendered more solid; but I am convinced by experience that there is no necessity for it, and that the colour is as permanent as any of the other blues prepared as I have directed above.

"The first time I prepared this vat, I proceeded according to a receipt sent me from Rouen. The soap-boiler's lixivium was simply denominated strong water. I suspected this to proceed either from malice or mistake, nevertheless, as in matters of fact it is unjust to condemn without examination, I tried the common aqua-fortis, which produced the following effect.

"I took half a pound of indigo, well powdered, and steeped it in half a pint of common aqua-fortis, made with vitriol and salt-petre: this produced a fermentation. In this situation I left it for 24 hours; and having, as in the preceding operation, dissolved a pound of copperas in some lime water, I poured these two mixtures into a cask containing about 17 gallons of river water. I stirred it well, but there appeared nothing extraordinary the next day. I still continued to stir three times a-day for two days together, and then suffered it to rest for two days more, persuading myself that it was absolutely spoilt. At the expiration of these four days, the liquor became of a red colour, but clearer than the pastel vats. I stirred it once more, and let it stand six days longer: it had then a little froth, but very pale: six days afterwards the surface of the liquor became brown, and underneath a brown green. I stirred again, and fancied that the liquor underneath was still reddish, though the froth which it threw up was of a good colour; I therefore conceived hopes that it would do, and that I should be able to work it the next day.

"At the expiration of sixteen hours I dipped some cotton, which took colour, but so very weak, that I was obliged to let it remain in the liquor several hours, till the blue became sufficiently deep. It then withstood the summer air and fun tolerably well for 12 days; nevertheless, I had the vat thrown out as useless, on account of its tedious operation. Doubtless it might have been recovered with lime, or some other alkali that would have absorbed the acid of the aqua-fortis, but it was not worth the pains. Besides, the answer which I received from the person who sent me the receipt from Rouen, contained an explanation with regard to the kind of aqua-fortis that should be used; from which I learnt that it should have been the soap-boiler's lixivium, which, instead of being acid, is one of the most caustic alkalis. In fact, by making use of this alkaline lixivium, the operation was attended with immediate success, and never failed me since.

"I tried several of these different vats in miniature of dyeing in cucurbit, put into a water or sand bath. These blue in laft are attended with no difficulty: it is only necessary to diminish the quantity of the liquor, and of c. titius very engredient, in proportion to your vat, and it is scarce possible it should not succeed.

"Concerning that which I first described, and which is yet hot, as it is attended with a little more difficulty, and several persons may wish to try this operation themselves, being rather curious, and requiring neither experience nor preparation in miniature: I will give the description of a process which succeeded extremely well, and which I purposely supplied with much more indigo than is generally done in the common method.

"I boiled two quarts of water with two drachms of madder, and four ounces of pearl-ashes. When it had boiled a quarter of an hour, I poured it into a cucurbit, containing about a gallon, which was previously heated with hot water, in which I had put a quarter of a handful of bran. The whole being well stirred with a deal spatula, I put my cucurbit into a very
Method of Dyeing wool or woollen fluffs in any of their vats.

After having prepared the vats according to any of the methods above-mentioned, the dyeing any kind of woollen fluff is exceedingly easy; no other preparation for the dye being requisite than simple immersion in warm water, wringing them, and then dipping them in the vat for a longer or shorter time according to the depthness of the colour you wish to impart. From time to time the stuff should be opened; that is, taken out and wrung over the vat, and expoing it for a minute or two to the air till it becomes blue; for it must be observed, that in all the solutions of indigo or other materials hitherto described, the blue colour is produced by exposure to the air alone, and the stuff is always taken out green, and will retain that colour if not exposed to the air. In dyeing blue, therefore, it is necessary to let the colour change in this manner before you immerse it a second time, that the shade may be the better distinguished; for dark blues require to be dipped several times, but it is dangerous to make this experiment with light blues. When a large quantity of wool is to be dyed, which cannot be put into the vat all at once, it very often happens that the quantity first put in will take up the deepest dye. To prevent this, some dilute their indigo-vat with a quantity of warm water; but M. Hcllot disapproves of this, as being apt to produce a fading colour. The best method he says, is to dip them when the vat is nearly exhausted; and for this purpose he recommends the following:—Take any stuff; and when the colours produced in this manner are less bright than the others, they may be feenable enlivened by pailing the fluffs through boiling water. This, he says, is proper for all blue colours; as it not only renders the dye more fixed and bright, but cleanses the fluffs from accidental impurities. After the work is taken out of the hot water, it is to be rinsed in a running stream. It will be still more proper to pull a dark blue fluff well with soap and water, and afterwards to rinse it in running water; for the soap will be far from injuring the colour, that it will thereby be rendered more bright and lively. Some dyers, in order to fave the dearer ingredients of pascal or indigo, make use of logwood; but this is by no means allowable, as the colour, though rather brighter than that of indigo, is exceedingly pernicious. In 1748, M. Macquer of the Royal Academy of Sciences discovered a method of dyeing silk and cloth with a preparation of Prussian blue, superior to all the blues hitherto discovered. This, however, has never yet come into practice, nor is it at all probable that the colour of this pigment can ever be made to stand washing with soap. In all the methods in which we could try the experiment, it could not even bear washing with plain water. Indeed, when we consider the great volatility of the colouring matter of Prussian blue, that it can only be fixed by iron, and that any alkaline matter will instantly turn it, and make it refuse its former volatility, there can be but very little hope of overcoming the difficulties which attend the process.

Having been so particular with regard to the preparation of the materials and method of dyeing wool, quar’s meet we need say the less concerning the method of dyeing silk or cotton. The following composition is recommended by M. Macquer. “To eight pounds of the finest indigo add six of the best pearl-ash, from three to four ounces of madder for every pound of ashes, besides eight pounds of bran, washed in several waters to take out the flour. When washed, and most of the water squeezed out, it is placed alone at the bottom of the vat. The pearl-ash and the madder are then mixed, bruising them thoroughly together, and then boiling them for a quarter of an hour in a copper containing two-thirds of the vat; the liquor is then suffered to reft, and the door of the furnace shut.

Two or three days previously to this, eight pounds of indigo are steeped in a bucket of warm water, washing it well, and even changing the water, which has a reddish cast. Some begin with boiling the indigo in a ley of one pound of pearl-ash with two buckets of water; after which they pour it while quite wet in a mortar; then while it is in a paste, they fill the mortar with hot liquor which has been boiled before; letting it stand for a short time, and then pouring off the clear into a separate boiler or into the vat. The same quantity of the mixture is then poured on the indigo which remained in the mortar, bruising and mixing it well, and then as before pouring it off into the boiler; which operation is repeated till the whole of the indigo is thus dissolved in the liquor. That in the boiler is gradually poured into the vat upon the bran in the bottom, adding afterwards the remainder of the composition, grounds and all. After stirring and raking for some time, it is let stand, but without fire, till it becomes cool enough for the hand to bear. After this a little fire is to be put round the vat, only to prevent the same degree of heat; and this should be continued till the liquor becomes green, which is easily known by trying it with a little white silk. This shows that the vat is in a proper state; but in order to be ascertained of this, it will be necessary from time to time to stir it with a rake, when the brown and coppery scum which appears upon it after standing for a little time shows that it is in a proper state for working. Even in this case it is necessary to behave with the utmost caution, and to observe whether on blowing aside the coppery scum just mentioned a fresh one appears or not; for if it does not, it is a sign that the vat is not yet ready. If the scum appears, it must stand three or four hours, when a new composition is made to complete it. For this purpose, as much water as is necessary to fill the vat is put into a copper, boiling it with two pounds of ashes and four ounces of madder at first. This new liquor is poured into the vat, raked and mixed, and then left to stand for four hours, when it is ready for dyeing.
DYING.

The method of preparing silk for the blue dye is by boiling with soap, using 35 or 40 pounds of the latter to 100 of the former; but no impregnation with alum is required. Before dipping it in the vat, however, it should be washed from the soap; and to cleanse it more effectually, it ought to be twice boiled at the river, having been divided into hanks for the convenience of wringing. After being dipped in the vat, it is to be wrung as hard as possible, and then opened out to the air, to give it the blue color, as directed for wool; it should then be immediately washed in two waters, and well wrung out again. Lastly, it is to be dried as quickly as possible; cutting the thread which ties it, if the hanks are large, because if kept tied it frequently turns red under the thread.

Silk dyed as above directed is apt to take the blue very unequally, and will most certainly do so, if not washed and dried immediately after dyeing. Fine dry weather is always best for these operations; for should water accidentally fall upon it, it would be full of reddish spots. In moist weather, therefore, and during the winter, a room with a stove will be necessary. Different shades of blue are produced by dipping that first which is intended for the darkest color.

The method of dyeing cotton or linen blue is so little different from that already described with regard to woollen or silk, that nothing farther need be said concerning it; only the color upon cotton is generally less bright. M.de Apliny indeed tells us, that he has discovered a method of dyeing cotton velvets of a most beautiful and durable blue; but as he does not choose to communicate it, nothing can be said on the subject.

In the former edition of this work, a receipt was given for dyeing cotton of a very good blue color, and which, as being instantaneously done, may occasionally be useful. The indigo is dissolved in a mixture of lime and pot-ash (probably the pure caustic lixivium would answer fully as well); and after it is dissolved, some raifins are put into a pulp in a brass or marble mortar to be added. This very soon produces a copper-colored fumum at top; and the cotton being now dipped into the liquor receives the color in an instant. Linen may be dyed in the same manner.

The next of the primitive colors to be considered is red; of which there are many varieties but the principal are scarlet, crimson, and madder red. The dyeing of these colors differs considerably from that of the blues, because they require a previous preparation in the fluffs to be dyed; and it is on this preparation that the goodness of the color very often depends. These preparations are generally alum, tartar, aquafortis, aqua-regis, or solution of tin in these acids. Galls and alkaline salts are also sometimes added, tho' they do not of themselves contribute any thing to the color.

There are three kinds of scarlet, viz. that dyed with kermes, with cochineal, and with gum-lac. The first, called Venetian scarlet, is the lead bright, but more permanent, and left apt to be spotted than the others; in some it in some pieces of tapestry done with this at Bruxelles in Flanders, it has scarce lost any of its vitality in 200 years. However, it is scarce ever used except for tapestry, and is dyed in the following manner, according to Mr. Heliot.

"The wool should be first drenched; for which purpose you put half a bushel of bran into a copper, with a quantity of water sufficient for 20 pounds of wool, which to the best of my knowledge is the usual batch for one dyeing. In this liquor it should boil for half an hour, stirring it from time to time; after which it is taken out and drained. I shall observe, once for all, that when you dye worsted, you put a rod through each skein, which commonly weighs about a pound, and which should be kept on the rod during the whole process, by which means the skein is prevented from tangling. It is also convenient for turning the skein, in order to dip each part, that the whole may be equally coloured; for which purpose, you raise it about half way out of the liquor; and holding the rod with one hand, you pull the skein with the other, so as to let the part which before was next the rod fall into the liquor. If the worsted should be too hot for the fingers, it may be done by means of another rod. The equality of the color depends entirely upon the frequency of this manoeuvre, that it cannot be too strenuously urged. In order to drain them, you rest the ends of the rods just mentioned on two poles; which should be fixed in the wall over the copper.

"While the worsted is draining, after being thus drenched, you prepare a fresh liquor, viz. by throwing out what remained in the copper, and replenishing with fresh water; to this you add about a fifth part four water, four pounds of Roman alum grossly pounded, and two pounds of red tartar. As soon as it boils, the worsted on the rods should be immerced for two hours, almost continually moving the rods, one after another, as it have before directed.

"It is necessary to observe, that after the alum is put in, when the liquor is ready to boil, it will sometimes rise suddenly out of the copper, if you do not mind to check the boiling by throwing in cold water. If, when it is ready to boil, you put in the cold worsted quickly, it will have the same effect. It is also proper to observe, that when dyers work in the great, they should have their legs bare, that the hot liquor may not reft in the fankings. When the quantity of tartar is rather considerable, as in the present operation, the liquor does not rise so high, but when there is nothing besides the alum, sometimes, when it begins to boil, half of the liquor boils over, unless prevented by the above precautions.

"When the worsted has boiled in this liquor for two hours, drained, lightly squeezed, and put into a linen bag, it is deposited in a cool place for five or six days, and sometimes longer; this is called leaving the worsted in the preparation. This delay helps it to penetrate, and increases the action of the salts; for as a part of the liquor constantly evaporates, it is clear that what remains, being more impregnated with the saline particles, becomes more active, that is to say, provided there remains a sufficient degree of moisture; for the salts being once crystallized and dry, their power is destroyed.

"When the worsteds have remained in this state for five or six days, they are then in a proper condition for being dyed. A fresh liquor is then prepared, according to the quantity of the worsted; and when it grows warm, if you want a full scarlet, you throw into it 12 ounces of pounded kermes to every pound of worsted; but if the kermes be stale, it will require pound for pound.
DYEING.

When the liquor begins to boil, the worsted should be put in, being still moist; but if it has been suffered to grow dry after boiling, it should be put into warm water, and well drained.

Before you put the wool into the copper with the kermes, it was advisable to throw in a small handful of refuse wool, which, being boiled for a moment, imbibes a part of the blackness and drofs of the kermes; so that the wool afterwards dyed takes a much more beautiful colour. You now dip the skeins on the rods in the same manner as in the preparation, continually stirring them, and giving them air, from time to time one after another. In this manner they should be kept boiling for a full hour. They are then washed and drained.

If you would reap any advantage from the dye still remaining in the liquor, you may dip a little prepared wool, which will take a colour in proportion to the goodness of the kermes, and to the quantity which had been put into the copper.

If you mean to dye a number of shades, one darker than another, you require much less of the kermes; 7 or 8 pounds being sufficient for 20 pounds of prepared wool. You then dip the quantity of worsted intended for the lightest shade, leaving it in the copper no longer than necessary, in order to turn it, that it may imbibe the colour equally. It is then raised upon the pegs, and the next shade immediately put in and suffered to remain for a longer time. You proceed in this manner to the last shade, which should also remain till it has acquired the colour you desire.

You begin with the lightest colour, because if the wool was suffered to remain in the copper longer than necessary, it would be no loss, provided you preserve this batch for the darker shade; whereas, by beginning with the darkest, you would have no remedy in case of any accidental skip in the light shades. The same precaution is necessary in regular shades of all colours; but when the colour in question these are seldom made, because the dark shades are not much in use: and as the operation for all colours is the same, what I have said respecting this will answer for all the rest.

When the wool has been dyed in this manner, and before it is carried to the river, you may [will it in warm water, with a small quantity of soap, well dissolved; this adds a brightnes to the colour; but, at the same time, gives it a little of the rote, that is to say, a crimson tincture.

In order to render this colour more bright and beautiful than common, I have tried a great number of experiments, but could not obtain a red equal to that produced by cochineal. Of all the liquors for the preparation of wool, that which succeeded the best was made according to the proportions I have mentioned. By changing the natural tinge of the kermes, by various kinds of ingredients, metallic solutons, &c. various colours may be obtained, which I shall presently mention.

It is impossible to prescribe any proportions for an ell of stuff, considering the infinite variety of their breadth, and even of their thickness, and the quantity of wool in their fabrication; experience is the best guide. Nevertheless, if you choose to be exact, the surest way is to weigh the stuff to be dyed, and to diminish about one quarter of the colouring ingredients prescribed for worsteds; because the stuffs take internally less colour, as their texture, being clover, prevents it from penetrating; whereas the worsted or woolen fleece takes the colour internally as easily as on the exterior surface.

The alum and tartar, used in the preparation for stuffs, should also be diminished in the same proportion; neither is it necessary to let the stuffs remain in the preparation as long as the worsted; they may be dyed even the day after they had been boiled.

Woolen fleece dyed in the red of kermes, and to be afterwards incorporated in mixed cloth, or for the manufactory of thick cloths, will have a much finer effect than if dyed with madder.

A mixture of half kermes and half madder, is called scarlet in half-grain. This mixture gives a colour extremely permanent, but not so lively, inclining rather to a blood colour. It is prepared and worked precisely in the same manner as if kermes alone were used; only that in the liquor they put half this grain, the other half is supplied by madder. This is consequently much cheaper; and it frequently happens that the dyers who make it, render it much less beautiful than it might be, by diminishing the quantity of the kermes and increasing that of the madder.

From the trials made on scarlet in grain, or scarlet of kermes, both by exposing it to the sun and by various liquors, it is proved that there does not exist a better nor a more lasting colour. It may for solidity be compared to the blues already mentioned. Nevertheless, the kermes is scarce ever used except at Venice; for since the fiery scarlets are become the taste, this colour is almost entirely exploded. It has, notwithstanding, many advantages over the other, as it neither blackens nor spots; so that should the stuff get greased, the spot may be taken out without impairing the colour. Nevertheless, kermes is little known to the dyers, that when I wanted a certain quantity for the above experiments, I was obliged to have it from Languedoc; the merchants of Paris encumber themselves with no more than what they vend for the use of medicine.

The second kind of scarlet, viz. that dyed with cochineal, is much more expensive and less permanent than the other. For inferior uses, such as tapestry, the colour is sometimes partly done with Brazil wood; but this colour cannot be made equally permanent with cochineal: and it is remarkable, that in whatever manner these fugitive colours be mixed with permanent ones, the latter never convey to them any portion of their durability, but, on the contrary, both go off together. The true cochineal scarlet is very difficult to dye in perfection, and almost every dyer has a receipt of his own for the purpose. The success of the whole operation, however, according to Mr Pellot, depends upon the choice of the cochineal, the water used for dyeing, and the method of preparing the solution of tin, which is now universally known to be the only ingredient by which a scarlet colour can certainly be produced. The following is his receipt for the preparation of this liquid, which from his own experience he gives as the best. To eight ounces of spirit of nitre add as much river water, dissolve in the mixture gradually half an ounce of very white sal-ammoniac,
In order to make an aqua regis, to which add two drachms of purified salt-petre. This last ingredient, he owns, might be omitted; but he is persuaded that the use of it contributes to make the colour more uniform. In the liquor thus prepared dissolve an ounce of English tin reduced into grains by dropping it, when melted, into a basin of cold water. These are to be dropped into the liquor one by one, waiting for the dissolution of the first before we add a second, in order to preserve a quantity of red vapours, which are the phlogisticated nitric acid; and to the mixture of which he supposes the beauty of the colour is partly owing. The solution prepared in this manner is of the colour of solution of gold; and if fine tin be made use of, there is neither black dust nor sediment of any kind to be seen in it; but though transparent when just made, it is apt to become milky with the heats of summer; which, however, is no detriment to it in our author’s opinion; and it is certainly just, if the transparency returns with the coolness of the solution. The aquafortis or spirit of nitre used for this purpose ought to be such as will difsolve half its weight of silver; and by following this method you will always be certain of having a composition of an equal strength; so that any slight difference which may arise from the quality of the cochineal will scarce be perceived. A weak solution makes the scarlet incline towards crimson, and a strong one towards orange.

When worked is to be prepared for the scarlet dye, the following operation is necessary. For every pound of the stuff, ten gallons of clear river water are to be put into a small copper; and when it becomes pretty hot, two ounces of cream of tartar, and a drachm and an half of cochineal, both finely sifted, are to be added. A brisk fire is to be kept up; and when the liquor is ready to boil, two ounces of the composition already described must be added, by which the liquor is immediately changed from crimson to blood colour. As soon as it begins to boil, the worked previously steeped in hot water, and then expressed, is to be added. It must be suffered to boil for an hour and a half; after which it is taken out, gently stirred, and washed in cold water, having taken care to stir it constantly all the time. It will now be a tolerable fresh colour, or even somewhat darker, according to the goodness of the cochineal and the strength of the solution of tin; but the colour will be so totally absorbed by the stuff, that the remaining liquid will be almost as colourless as water. This is called the scarlet boiling; and without this the dye would not hold. To finish the dye there must be another preparation of very clear water, the goodness of this being of the utmost consequence to the goodness of the colour. In this preparation, along with the other ingredients, there must be half an ounce of scarlet; and when the liquor is pretty hot, six drachms and an half of cochineal, likewise finely powdered, is to be added. A little before it boils, two ounces of the solution of tin are put in; but which, as in the former case, the colour is instantaneously changed. As soon as it begins to bubble, the worked is to be dipped, allowed to boil an hour and an half, stirring it all the time, and then washing it as already directed. An ounce of cochineal will be sufficient to give a proper depth of colour to a pound of wool; a drachm or two more might be added, if you would have the colour very deep, but if it be much enlarged, the dye will turn out very dull.

In dyeing the scarlet colour, the material of which Proper means the cauldron is made is by no means a matter of small conformation. On this our author has the following observations. Their cauldrons in Languedoc are made of fine tin. They are also used by several dyers at Paris; but Mr. Julienne, whose scarlet is very highly esteemed, makes use of braze cauldrons. There are also used in the dyeing manufactory of St. Dennis. Mr. Julienne is careful only to suspend a large pack-thread net, with pretty small meshes, in his cauldron, to prevent the stuff from touching. At St. Dennis, instead of a net they use a large open wicker basket; but this is less convenient than the net, because it requires a man at each side of the copper to keep it even, and to prevent it, when loaded with the stuff, from rising to the surface of the liquor.

This practice, so different with regard to the materials of the cauldron, determined me to make an experiment. I took two ells of white Sedan cloth, which I dyed in two cauldrons, one of copper, furnished with a pack-thread net, and another of tin. I weighed the cochineal, the composition, and other ingredients, with as much accuracy as possible. They boiled exactly the same time. In short, I was sufficiently attentive to make the operation the same in every particular; that in case of any perceptible difference it could only be attributed to the different materials of the cauldrons. At the first boiling, the two patterns were absolutely alike except that the piece done in the tin cauldron was rather more marked, and not quite so even as the other; but this in all probability might be occasioned by their not having been equally cleansed at the mill. I finished each piece in its proper cauldron, and they were both of them very beautiful. Nevertheless, it was very evident that the cloth which had been dyed in the tin was more fiery and the other rather more crimfoned. They might have been easily brought to the same shade; but this was not my object. From this experiment, it appears that, with a copper cauldron, the quantity of the composition should be increased; but then the cloth grows harsh to the touch. Those who dye in copper, to prevent this evil add a little of the turmeric, which is a drug only used for false colours, and therefore prohibited by the regulations to dyers in grain, but which gives scarlet that dazzling fiery colour so much the fashion at present. It is, however, if you have any suspicion, easy to discover the deception, by cutting the pattern with a pair of scissors. If it has no turmeric, the cut edge will appear white, otherwise it will be yellow. When the close texture is equally dyed with the superficies, let the colour be what it will, they say the colour cuts, and the contrary when the middle of the texture remains white. Legitimate scarlet never cuts. I call it legitimate, and the other false, because that with the addition of the turmeric is more liable to fade. But as the taste for colours is so variable, as the bright scarlets are so present the mode, and as it is necessary, in order to please the buyer, that it should have a yellow cast, it were better to authorise the use of the turmeric, though...
DYEING.

A false colour, than to allow too large a quantity of the composition, by which the cloth is injured, being more liable not only to dirt, but also to tear, as the fibres of the wool are rendered brittle by the acid.

"I must also add, that a copper cauldron should be kept extremely clean. I have myself frequently failed in scarlet patterns by neglecting to clean the cauldron. I cannot in this place forbear condemning the practice even of some eminent dyers, who at about six o'clock in the evening make their preparation in a copper cauldron; and, in order to gain time, keep it hot till day-light the next morning, when they dip their stuffs. The preparation may undoubtedly corrode the copper during the night; and, consequently, by introducing coppery particles into the cloth, injure the scarlet. They will tell us that they do not put in the composition immediately before the cloth is dipped: but this is no apology; for the cream of tartar added on this is no apology; for the cream of tartar added on what would infallibly contribute to the beauty of the colour. But the large, never dyed in the wool, especially when the colours are kept during the night; and

The second reason is peculiar to scarlet, or rather to the cochineal, which being heightened by an acid, cannot stand the felling without losing much of its colour, or being at least excessively crimsoned. For the soap which contains an alkaline salt destroys the vivacity produced by the acids. Hence it is evident that neither cloth nor stuffs should be dyed scarlet till they have been full'd and dried.

"To dye different pieces of cloth at the same time, the directions already given do not entirely answer.

"For example, in order to dye five pieces of Car- cassonne cloth at the same time, each piece five quarters, broad, and fifteen or sixteen ells in length, it is different pieces of necessary to observe the following proportions: You begin by making the composition in a very different manner from the preceding process, viz. twelve pounds of aquafortis put into a stone jar or glazed vessel, with twenty-four pounds of water, and one pound and a half of tin grains added. The solution goes on more slowly than according to the acidity of the aquafortis, and should stand for twelve hours at least. During this time a kind of blackish dirt falls to the bottom; the top should then be drained off the sediment; this liquor is of a clear lemon colour, and is preferred by itself. This process evidently differs from the first by the quantity of water mixed with the aquafortis, and by the small portion of tin, of which perhaps any remains in the liquor; for the aquafortis not being in itself a solvent for tin, only corrodes and reduces it to a calx, provided neither saltpetre nor sal ammoniac be added, which would convert it into an aqua regia. The effect of this composition is not, however, different from others, and is perceptible to those who from experience are competent judges of this colour. The composition without sal ammoniac has been for a long time used by the manufacturers of C. accuse, who doubtless imagined that its effect was owing to a supposed sulphur of tin, and may be preferred from purefaction for thirty hours in winter and only twenty-four in summer. It then grows turbid, forms a cloud which falls to the bottom of the vessel in a white sediment. This sediment is a small portion of the tin, which was suspended in an acid not prepared for the solution. The composition, which ought to be yellow, becomes clear as water; and if employed in this state never succeeds, but produces the same effect as if it had been milky.

"When the composition is prepared, as I have now described, according to M. de Fondieres, you put, for the quantity of cloth last mentioned, about sixty cubic feet of water into a large copper; when the water grows warm, you add a sackful of bran; it is sometimes necessary to use four water; they will either of them do, as they say, to correct the water, viz. to absorb the terreous and alkaline substances, which diminish the tinge of the cochineal. We should be well informed concerning the nature of the water employed, in order to know whether these corrections be necessary.

"Be
DYING.

Be it as it may, when the water is a little more than warm, you add ten pounds of crystals or cream of tartar pulverized, that is to say, two pounds to each piece of cloth. The liquor should be then violently stirred; and, when rather hot, you should put into it a half pound of the powder of cochineal, mixing it well together, and immediately afterwards you pour into it twenty-seven pounds of the composition, very clear, which also requires to be well stirred. As soon as it begins to boil, the cochineal, suspended, should boil very fast for two hours, and during that time should be kept in continued motion on the wench, and when taken out passing it through the hands by the lifting, in order to open and give it air. It is afterwards carried to the river and well washed.

In order perfectly to understand the method of stirring the cloth, it is requisite to observe, that a kind of reel or wench, with a handle for turning, should be placed horizontally on the iron hooks which are fixed in the fellos that support the edge of the cauldron. You first join the several ends of each piece of stuff to be dyed at the same time; and as soon as they are immersed, you carefully keep the end of the stuff in your hand; you then lay it on the reel, which should be turned till the end of the last piece appears. It is then turned the contrary way, and in this manner every piece will be dyed as even as possible.

When the cloth has been well washed, the cauldron should be emptied, fresh liquor prepared, to which you must add, if necessary, a shuck of bran or some four water; but if the quality of the water be very good, there is no occasion for any addition. When the liquor is ready to boil, you put in eight pounds and a quarter of cochineal pulverized and sifted. The whole is then mixed together as even as possible; but when you cease to stir, you must mind when the cochineal rises to the surface, forming a kind of scum of the colour of lees of wine. As soon as this scum begins to divide, you pour in eighteen or twenty pounds of the composition. You should have a vessel full of cold water near the cauldron ready to throw in, left after putting in the composition it should rise above the edge, as is sometimes the case.

When the composition is put into the copper, and the whole well mixed, you turn the wench quick for two or three turns, that every piece may imbibe the cochineal equally. It is then turned more slowly, in order to let the water boil. It should boil very fast for two hours, constantly turning and keeping the cloth down with a stick. The cloth is then taken out, and passed through the hands by the lifting, in order to give it air and to cool it; it is afterwards washed at the river, dried, and dressed.

There is a considerable advantage in having a great quantity of stuff to dye at the same time; as for example, when the five first pieces are finished there remains a certain quantity of the cochineal, which, supposing seven pounds at first, might amount to twelve ounces; so that cloth put into this second liquor will imbibe the same shade of rufé-colour as if you had coloured a fresh liquor with twelve ounces of cochineal. The quantity remaining may, however, vary very much according to the quality of the cochineal, or according to the fineness of the powder. Though the quantity of colour remaining in the liquor may be very inconsiderable, it nevertheles deserves attention on account of the dearth of this drug. Of this liquor, therefore, a preparation may be made for five pieces of cloth; and it will require less of the cochineal and less of the composition, in proportion, as near as you can guess, to the quantity remaining in the liquor. It is also a saving of fuel and time; but it is impossible to give positive directions concerning this manoeuvre, which must be left to the ingenuity of the dyer; for having dyed the stuff, after the scarlet, you may make a third preparation, which will dye a flesh-colour. If there is not time to make these two or three preparations in 24 hours, the liquor spoils; some Scarlets thus crimsoned in the same liquor in which they had been dyed, are never so bright as those done in a fresh liquor. Drugs which reciprocally destroy each other's effect are more efficacious when employed in succession.

When you dye cloth of different qualities, or any kind of stuffs, the best method is to weigh them, and for every hundred pound to allow about six pounds of crystals or cream of tartar, eighteen pounds of the composition in the preparation, the same quantity in the completion, and in each of them six pounds and a quarter of cochineal. For the accommodation of those who would make small experiments, the whole may be reduced, viz. one ounce of cream of tartar, six ounces of the composition, and an ounce of cochineal for every pound of stuff. Some of the Paris dyers succeed very well by putting two-thirds of the composition and a quarter of the cochineal in the preparation, and the remaining third of the composition, and the other three-fourths of the cochineal, to the completion.

It is not the custom to put crystal of tarts in the finifh: I am however convinced by experience that it does no harm, provided that at most you put but half the weight of the cochineal; and in my opinion it made the colour rather more permanent. There have been dyers who have died scarlet at three times: in this case they had two preparations, and afterwards the finifh; but they always used the same quantity of drugs.

We have already observed, that the kermes were so little used for brown or Venetian scarlets, that these kind of colours were made with cochineal. For this purpose the preparation is made as usual; as for the dyeing they add to the liquor eight pounds of alum to every hundred weight of stuff. This alum is dissolved in a separate cauldron with a sufficient quantity of water: it is thrown into the liquor before the cochineal. The remainder is done precisely the same as in common scarlet: it gives the cloth the colour of Venetian scarlet; but it is not by any means so permanent as the colour obtained from kermes.

There are no alkaline faults that do not crimson scarlet; but it is more generally the custom to use alum, because these alkaline faults are no addition to the permanency of the colour, and may possibly injure the stuffs, because all animal substances are dissolved by fixed alkales. The alum, by being deprived of its phegm by calculation, will more certainly crimson. The liquor which had been used for crimsoning is red, and
and still redder in proportion as the scarlet is more
crimsoned, so that the colours part with much of their
basis in the liquor by which they are darkened. It is,
however, impossible to darken in grain without fats.
The late Mr Barron, in a memoir which he prefixed to
the Royal Academy of Sciences 12 or 15 years ago,
remarks, that he succeeded better with the leaf of
tar, than with any other leaf, for uniting the col-
our and preserving its brightness and solidity; but as
he observed, it is very inconvenient to make any quan-
ty of this leaf.

It has been observed, that the choice of the water
for dyeing scarlet was of importance; the greatest part
of the common waters fail, because they almost al-
tways contain a quantity of slaty or calcareous earth,
and sometimes of fulphuric or vitriolic acid. These
are commonly called hard waters; by this term they
mean water that will not dissolve soap, and in which it
is not easy to dress vegetables. By absorbing or pre-
cipitating these heterogeneous substances, all waters
are rendered equally good. If the matter be alkaline
a little four water will produce this effect. Five or six
cubic feet of this four water, added to 60 or 70 cubic
feet of water before it has boiled, will cause the
alkaline earth to rise in a feum which may be easily
taken off the liquor. A sack full of any kind of white
mucilaginous root in small bits, or, if dry, pow-
dered, will also, if the sack be left to soak in the wa-
ter for a half or three-quarters of an hour, correct
a doubtful water; and, as we have said above, will also
answer the same end tolerably well.

The scarlet produced by gum-lac, though less bright
than cochineal, has the advantage of being more per-
manent. The lac most esteemed for dyeing is of a
branch form. The colour is that of an animal, like
that of cochineal and kermes, and the branded kind
has more of the animal particles in it. The best kind
is of a blackish brown colour on the outside, and red
within; and from some experiments made by M. Geo-
frey, it appears to be a kind of comb, somewhat refem-
bling that made by bees or other insects of that kind.
Dyers sometimes use it when pulverized, and tied up
in a bag; but to this M. Hellot objects, because some
of the gum-refin being melted by the heat of the boil-
ing liquid, escapes through the cloth, and adheres to
it so closely, that it must be scraped off with a knife
when cold. Others endeavour to extract the colour
by boiling it in water after it has been reduced to pow-
der, and then letting it fland to settle, and pouring off
the coloured liquid; but in this way it often turns pu-
trid. M. Hellot, therefore, after several unsuccessful
trials to extract all the colour readily, had recourse at last
to mucilaginous roots; which, without communicating
any colour of their own, retained that of the lac so effec-
tually as to remain with it upon the. filter. Comfrey
root was that with which he succeeded best. For ex-
tracting the colour, he used it dried and powdered.
In the proportion of half a drachm to a quart of water.
In this it is to be boiled for a quarter of an hour;
then strained through a linen cloth, and poured while
quite hot upon the gum-lac powdered and sifted through
an hair-feve. By this it immediately acquires a fine
crimson colour; after which the whole is let to digest
in a moderate heat for twelve hours, flittering the gum
which remains at the bottom seven or eight times. The
water thus impregnated with the colour is afterwards
decanted into a vessel large enough to contain four
times the quantity, which is then to be filled with cold
water. A small quantity of strong solution of Roman
alum is then added; the coloured mucilage subsides;
and if any colour remains in the liquor, it may be pre-
cipitated by the addition of some more alum, until at
last the water will be left entirely colourless. After
the crimson mucilage is entirely sunk to the bottom,
the clear water is drawn off with a pipkin, and the re-
mainder put upon a filter, to let the liquid slowly drop-
off or evaporate. If the whole of the colour be not
extracted from the lac by one operation, it is to be re-
peeled till no more appears, and the residuum becomes
of a pale straw-colour. The blast salt, detached from
its branches, does not yield more than one-fifth of its
weight in colour; and hence there is no great advan-
tage to be made by substituting it in place of co-
chineal for the scarlet dye.

For dyeing scarlet with this extract of gum-lac, the Method
of requisite quantity of it, dried and powdered, is to be using the
put into an earthen or block-tin vessel. Some hot water extract of
is then to be poured upon it; and, when well mois-
tened, add the proper quantity of the fracon composition,
flittering the mixture with a glass plate. By this means
the powdered, which before was of a dark dirty purple,
acquires an exceedingly bright scarlet. The solution
in which the cristals of tartar had been previously dis-
olved is then to be poured into the liquid; and as soon,
as the latter begins to boil, the cloth is to be dipped
into it, turning it over and over according to the com-
mon method. The remainder of the operation is to
be performed in the same manner as if cochineal were
used. The extract, in our author's opinion, afford-
ated to a ninth part more colour than cochineal.

Crimson is the colour produced by cochineal with
alum and tartar only, without any solution of tin.
For this colour two ounces and an half of alum, with
an ounce and a half of white tartar, are to be taken
for every pound of wool. These being put into a caul-
drum with a proper quantity of water, are to be made
boil before the stuff is dissolved, and immediately;
as soon as the liquid begins to boil, the cloth is to be dipped
into it, turning it over and over according to the com-
mon method. The remainder of the operation is to
be performed in the same manner as if cochineal were
used. The extract, in our author's opinion, afford-
ated to a ninth part more colour than cochineal.

A fresh liquor must be prepared for the dye, in which
an ounce of cochineal is to be put for every pound of
wool. When it begins to boil, the wool is to be put in,
and managed as already directed for scarlet. For the
finest crimson, the stuff, after the common process
is finished, should be dipped in a new liquor in which
a small quantity of taf ammoniac is to be dissolved,
and an equal quantity of pot-ash added after it is pretty
hot.

A very beautiful crimson is obtained by boiling the
wool as for common scarlet, then making a second pre-
paration with two ounces of alum, and an ounce of
tartar to every pound of wool. It should remain an
hour in this decoction. A fresh liquor is then to be
prepared immediately; in which to every pound of
wool you put six drachms of cochineal. When it has
remained an hour in this liquor, it is taken out and im-
mediately dipped in a solution of barilla and tal am-
moniac.
Dyeing.

To fadden the grain of scarlets, the silk when taken out of the cochineal liquor is washed and twice becketed at the river; the water-liquor is then prepared, in summer as it is, but in winter a little warmed, adding a solution of copperas, more or less according to the darkness of the shade required. The silk should be returned in this liquor, in small banks, till it becomes very even; and when the shade is equal to expectation, should be taken out, wrung and put to dry without washing if you like, because the copperas liquor is little more than clean water. The copperas gives the cochineal a violet tinct, depriving it of its yellow. If, however, it should appear to lose too much of its yellow, it may be preferred by adding to the copperas liquor a little of the decoction of sult. Nothing but copperas will fadden grain scarlets; the logwood being quite useless for this purpose, copperas alone will suffice, as it darkens greatly with the nattails in grain scarlets.

The process just related for producing this colour is the most in use at present, as it gives a more beautiful shade than can be obtained by any other method. Nevertheless, as many dyers proceed in the old way, we shall describe it here.

For these grain scarlets, the round pattle, as imported from the Indies, is added in the boiling of the silk. When the soap boils, about an ounce of rocon is bruised in the cullender, in the same manner as described for orange-colours. It should be pounded as fine as possible, left any lumps should remain and stick to the silk.

This small quantity of rocon, in the boiling of the silk, has the same effect as the composition, yellowing a little. The remainder of this process is the same as the preceding; but without the addition of either composition or tartar.

The silk dyers are accustomed to use only the finest cochineal, and even always prefer the prepared cochineal, which is cleansed from all its impurities, sifted and picked. This is certainly commendable, considering that the cochineal not prepared being less pure, the more of it must be added, and that the dregs remaining in the liquor may injure the colour. The white tartar used in grain scarlets serves to exalt and yellow the colour of the cochineal, producing this effect by its acidity, all acids having the same effect; we must, however, observe, that tartar is preferable, as it gives a more beautiful tint. But, notwithstanding the quality of the tartar, it is still incapable of exalting the colour of the cochineal sufficiently to produce a grain scarlet, whatever quantity may be employed; for if the dose of this ingredient be moderate, it will not yellow enough; and if too large, it destroys and degrades the colour, without any good effect. In order to affist the tartar, it will be necessary to add some of the composition, which, as we have seen, is nothing more than a solution of tin in aqua regia. This solution with cochineal, when used for dyeing of worsted, has a considerable effect, changing it from a crimson, its natural colour, to a prodigious bright fire colour; and produces only a crimson when applied to silk: but it gives this colour a very beautiful tinct; for uniting with the tartar, it augments this effect without impoverishing the colour, having the roon ground, as we have before observed.
DYEING.

As to nutgalls, they produce no good effect with regard to colour: on the contrary, if you use too much, they tarnish to a degree, entirely spoiling the colour; nevertheless, it is always the custom to put the quantity we have specified.

One might probably conjecture from the introduction of this practice, that scarlets were formerly produced with cochineal, without either tartar or composition, yellovving only with rocou: silk dyed in this manner, however, would have no ruffling, so that it could not be distinguished from silk dyed with Brazilwood. Nutgalls, on account of their concealed acid, having the property of giving the silk a great ruffling, are therefore added with cochineal; by which means these scarlets are distinguished by the feel from the scarlet of Brazilwood: for we must observe, that the Brazil dye cannot stand the action of the nutgalls, by which it is entirely destroyed.

But besides giving this ruffling to the silk, it has at the same time the singular and very remarkable quality of adding to its weight very considerably; so that by putting one ounce of nutgalls to every pound of silk, you add two or two and a half per cent. to the weight: by this means some silk-dyers add even seven or eight per cent. They are so much accustomed to this advantage in weight, owing to the nutgalls, that even when this drug becomes useless by the addition of the tartar and composition, which produces the same ruffling, they make it still necessary on account of the weight, which is not proportionably increased by the other acids. White nutgalls are always preferable to those of all dyes for silk, and indeed to produce a good scarlet or crimson red colour, upon it has hitherto been a desideratum in the art. The following are M. Apligny's directions for dyeing such reds as are commonly in use. It is necessary, previous to the dyeing of cotton thread, to cleanse it from that unctuous matter by which the dye is prevented from penetrating its pores. For this purpose they make use of four waters; which is prepared by throwing some handfuls of bran into hot water, and letting it stand 24 hours, or till the water becomes clear, when it is fit for use. These four waters, however, cleanse the cotton but very imperfectly, carrying off only the superficial part of the unctuous matter, which river water would do as well. The lixiviums of ashes are more effectual; and therefore all fixed alkalies, particularly kelp, or even the ashes of new wood, are, for the reason I have already given, generally preferred for this operation. The salts are extracted in the same manner as by the bleachers; and the cotton is then steeped in these lixiviums, which, like the silk, is included in a clean linen pocket or sack, to prevent the skeins from tangling: it should boil for a couple of hours: when perfectly cleansed, the pockets sink to the bottom of the liquor, because the impeding matter being removed, the water penetrates the pores. The pocket is then taken out of the copper, the skeins separated from each other, and washed at the river. They are afterwards wrung on the peg, and again rinsed till the water comes off clear. The skeins are then spread on the perches to dry.

To dye cotton red requires three preparations, viz. cleaning, galling, and aluming. The operation of cleaning as above.

With regard to the galling, any kind of galls may be used in case of necessity; or even tan may be substituted; but that requiring more, it would not answer the purpose so well. The black Aleppo galls, because they suffices, are preferable to the white galls, which though cheaper make the expence come nearly equal. The Aleppo galls are, however, liable to dull the colour, which though easily revived, the white not producing this inconvenience, are generally preferred by most dyers. It requires nearly five quarts of liquor to drench one pound of cotton; so that for 20 pounds, five pounds of pound galls are boiled in about 120 quarts of water; it should boil for two hours, or till by pressing it between the fingers it breaks easily.

This liquor is drawn off clear, and poured into a tub, into which, when cold, or even whilst warm, the cotton, which was before divided into hanks of about eight ounces each, and tied with a thread to prevent them from tangling, is dipped. Suppose, for example, that having about 40 of these hanks, and 100 quarts of the gall liquor, a part of it necessarily evaporating
raking in the boiling, five quarts of this liquor is taken out of the tub and put into a trough, into which you dip two skeins at once, carefully working them till they are soaked. They are then taken out and laid in an empty tub, pouring over them the remainder of the liquor in which they had been soaked: five quarts more are then taken out of the tub containing the gall water, poured into the trough, and two more hanks dipped into it, and so on successively till the whole is galled. The gall liquor should be stirred in the tub every time you take out, that the whole of the cotton may be galled equally, which it would not be the grounds to settle at the bottom. This operation finished; if any of the liquor remains, it is poured on the galled cotton, being orderly ranged in the tub; where, after remaining 24 hours, it is taken out skein by skein, gently wrung, and then put to dry.

"The aluming for the cotton consists of about four ounces of Roman alum for every pound of the substance. Having pounded the proper quantity of alum, it is dissolved over the fire in a copper containing a sufficient quantity of water, taking care not to let it boil, otherwise it would lose its strength. The liquor is immediately poured into a tub or trough of cold water, proportioned to the quantity of the cotton, so that the whole of the liquor may be as that of the galling, 100 quarts for every 20 pounds of cotton. It is the custom to add to this alum liquor a solution partly composed of arsenic and white tartar, with one part of the lixivium of kelp. The first solution consists of one grain of arsenic and two grains of white tartar, in two or three quarts of water. When the water in the copper boils, the arsenic and tartar, well pounded, is put into it, and kept boiling till the liquor is reduced to about half. When cold, it is strained and put into bottles or vessels, which should be stopped and kept for use.

"The kelp lixivium is made with about half a pound to a quart of water. You will know if this lixivium be sufficiently strong, when by putting an egg into it the point only appears on the surface.

"You then add to the alum liquor for this flupposed 20 pounds of cotton, 20 quarts of the solution, and three quarts of the said lixivium, observing nevertheless that the whole of the water used in mixing the alum and other substances be always in the proportion of five quarts of liquor to every pound of cotton. The 20 pounds of cotton are then plunged into this alming liquid, and kept boiling till the liquor is reduced to about half. When cold, it is strained and put into bottles or vessels, which should be stopped and kept for use.

"Some dyers never use the solution of tartar and arsenic with the alum, rationally flupposing that these substances, as they rust and yellow the red colours, would be prejudicial to the dye: the red furnished by madder, being already too much inclined to this shade, requires rather to be faded; and for this reason partly the kelp lixivium is added to the aluming. Several therefore, use six quarts of this lixivium instead of three; and these six quarts containing the salts of about three pounds of kelp, which by flupposing the kelp ashes to contain a quarter of its weight of salt, is in proportion of half an ounce to every quarter of a pound of alum.

"Instead of the solution of tartar and arsenic, others make use of a solution of sugar of lead, prepared separately. It should be observed in this particular, that when the sugar of lead is dissolved in common water, it becomes turbid and whitish, because plain water not dissolving this perfectly, a kind of partial separation of the calx of lead takes place; but by mixing a sufficient quantity of distilled vinegar with the water, the calx entirely disappears and the solution is complete.

"When the cotton is taken out of the aluming, it is lightly wrung on the peg, and dried. The more slowly it dries, and the longer before it is madder, the brighter the colour. Twenty pounds of cotton are generally dyed at the same time; but it were still more advantageous to dye only to, because when there are too many hanks to work in the copper, it is very difficult to dye them equally, the hanks first immersed having time to take a great deal of colour before the last are put in; for as the first cannot be returned upside down till after the last are plunged, it is morally impossible that the dye be not equal.

"The copper in which these ten pounds of cotton are dyed should contain about 240 quarts of water,—that is, 20 quarts of water for every pound of cotton; its shape should be an oblong square, and about two feet deep. It should be also wider at top than at bottom; the difference, however, should not be too great, because in that case the hanks laid flat on the sides would be liable to spoil. As several dyers have erred for want of knowing how much water the copper should contain respecting its dimensions, and as the greater the part of the brazier are likewise ignorant in this particular, it may not be amiss, in this place, to add a short and easy method of finding the contents of a vessel.

"Ready made Round or cylindrical, you begin by measuring the diameter; you then seek the circumference, afterwards the surface; and at last, by multiplying the surface by the perpendicular height, the product is the cubic foot for, and determines the contents of the vessel.

"For example, a copper 22 inches deep by 30 diameter; to find the surface, take the proportion of the diameter to the circumference, which is as 7 to 22: hence as 7 inches of the role of thirty, the first number 7, the second 28, and the third 39; the fourth number will be the circumference. His fourth number is found by multiplying the two middle numbers, 22 and 39, by each other, and dividing the product 660 by 7, the first number; the quotient 94 is the circumference sought for. If a square or oblong vessel, as in the present case, you have the circumference by adding the length of the four sides.

"Multiply afterwards the half of the circumference by the radius, that is 47 by 15, the product 705 is the number of square inches, and consequently the surface of your vessel.

"At last multiply 705 by 22, which is the perpendicular height, the product 15510 is the number of cubic inches your vessel contains. If it is larger at top than at bottom, it is necessary, in order to determine the circumference, to take a middle number between the breadth of the top and the breadth of the bottom; as if the copper be 23 inches at the top and at bottom 27, the middle number and real diameter is 30.

"Having multiplied the surface by the perpendicular height, you must reduce the inches to feet. Now the
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The square foot being equal to 144 square inches, and the cubic foot to 1728 cubic inches; you must therefore in this example divide 15510 by 1728, the quotient 9, will be about the number of cubic feet in the copper; and as a cubic foot contains 35 quarts, consequently the copper contains 318 quarts Paris measure. (The Paris pint is our quart.) To madder 10 pounds of cotton, a copper containing 248 quarts of water is made hot. When it is rather too hot for the hand, six pounds and a quarter of good Dutch grape madder is put into it, and carefully opened and diffused in the liquor. When it is well mixed, the cotton, which had been previously passed on the rods and suspended on the edge of the copper, is dipped into it hawk by hawk. When it is all dipped, the hanks on each rod are worked and successively turned upside down, beginning from the first that was put in, and so proceeding to the last; returning to the first, and thus continuing without intermission for three quarters of an hour, always maintaining an equal degree of heat, but without boiling. The cotton is then raised and drawn out upon the edge of the copper, and about a pint of the kelp lixivium poured into the liquor. The rods are then passed through the threads by which each hank is bound, and the cotton put back into the copper and boiled for about 12 or 15 minutes, keeping it entirely immersed during that time. It is at last raised, gently drained, wrung, washed at the river, and wrung a second time on the peg.

Two days afterwards the cotton is a second time maddered, about eight ounces of madder to every pound; that is, five pounds of madder added to the dyeing liquor. The cotton is then worked in it in the same manner as in the first maddering, with this difference, that none of the lixivium is added, and that the liquor is made of well-water. This maddering being finished, and the cotton cooled, it is washed, wrung, and dried.

To brighten this red, you put into a copper or trough a quantity of warm water sufficient to drench the cotton, pouring into it about a pint of the lixivium. In this liquor you immerse the cotton pound by pound; leaving it in for an instant only, when it is taken out, wrung, and dried.

On this operation it ought to be observed, that the method of dyeing in two liquors has no advantage. For, besides that it consumes more time and wood, the second maddering cannot furnish much dye, considering that the astringent farts are exhausted by the boiling of the first maddering; consequently that the cotton, when deprived of these farts, cannot take the dye. I propose therefore another method now pursued with success by several dyers: it consists in giving the cotton two alumings, and afterwards dyeing in one liquor only. By this means it takes the dye much better, and acquires more depth, because the whole of the madder turns to advantage. With respect to brightening, it is a needless operation for red cotton destined for the fabrication of calico; because the colour is brightened after it is woven, by dipping in warm water sharpened with a little of the lixivium. When the cotton is taken out of this water, if washed at the river and spread on the grass, the red brightens much better than by any other operation.

The reds hitherto mentioned are vulgarly called madder reds, though those I am going to describe are equally obtained from a species of madder coming from the Levant. The latter, however, commonly called lixivium, furnishes a dye incomparably finer than that produced by the best Zealand madder: it is, however, the fashion to call the red of madder the first dye, and the Adrianople red the second. The process of the latter I shall give in this place.

When you have 100 pounds of cotton to dye, you put 150 pounds of Alicante soda, inclosed in clean linen, into a tub. This tub should be full of holes at the bottom, that the liquor may run into another tub underneath. The 150 pounds of soda being in the upper tub, is covered with 300 quarts of river-water, measured by wooden pails containing each 25 quarts. The water that pales from the first tub into the second is again poured over the soda at different times, till it has extracted all the salt. This lixivium may be tried with oil: if it uniformly whitens, and mixes well with the oil without any appearance of separation at the surface, it is then sufficiently saturated with the salt. It may be also tried with a fresh egg, as I have said above. You again pour 300 quarts of water over the soda contained in the superior tub, in order to extract the whole of the salt. Two similar lixiviums are afterwards made, each with the same quantity of water as had been used for the soda, viz. 150 pounds of fresh wood-ashes, and the other with 75 pounds of quicklime. These three lixiviums being clarified, 100 pounds of cotton are put into a tub, and watered with each of these lixiviums in equal proportion. When it has perfectly imbied these salts, it is put into a copper full of water without being wrung, and boiled for three hours: it is afterwards taken out and washed in running water. This operation being finished, the cotton is then dried in the air.

A quantity of the abovementioned lixiviums is then poured into a tub in equal portions, so as to make 400 quarts. In a part of this liquor, 25 pounds of sheep's dung, with some of the intestate liquor, is well diluted by means of a wooden pestle, and the whole strained through a hair-sieve. Twelve pounds and a half of good olive-oil poured into this mixture; when finished instantly forms a foapy liquor. In this the cotton should be dipped, hank by hank, stirring every time, and with the same precautions I have already recommended in the alumining of cottons destined for the madder red. The cotton having remained 12 hours in this foapy water, is then taken out, lightly wrung and dried. This operation is repeated three times. The liquor that runs from the cotton when wrung falling again into the trough where the cotton was laid is called fuchsia, and should be kept for brightening.

When the cotton has been three times dipped in this foapy water, and afterwards dried, it is again dipped three times in another composition, made in the same manner as the first, with 400 quarts of lixivium and 124 pounds of oil, but without the sheep's dung: the remainder of this liquor is also preferred for brightening. The cotton having been dipped in this liquor three times with the same precautions, and left in it the abovementioned time, it is then carefully washed at the river to divest it entirely of the oil, without which the alumining would not take effect. Having been washed,
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60 Difficulty in producing a green by this process.

On this subject, however, several not unuseful reflections may be advanced.

First, the manner of purging the cotton indicates that this process is capable of damaging considerably, and of rendering the cotton very brittle, owing to the sharpness of the lixivium in which it is steeped, for burning in its nature as to make holes in the legs of the workmen who tread it with their feet. It is therefore more simple and less dangerous to cleanse the cotton in six quarts of lixivium to every pound of substance, and containing only six ounces of kelp for every six quarts; to boil the skins in it afterwards, enclosed in clean linen pouches.

By this method the cotton would be sufficiently cleansed without being spoiled; the kelp may be even reduced to half the quantity, substituting in its place double its weight of fresh wood ashes, which would answer quite as well.

Secondly, that the failure of many dyers is owing to their not sufficiently diverting the cotton of the oil, which prevents both the galling and aluming from taking effect. The mixture of the lixivium and oil not being well made, or the lixivium being too weak, the oil forms with it an imperfect combination. This oil, therefore, separating and swimming on the surface of the lixivium, stick to the cotton, which it greases, and by obstructing the pores prevents the gall from penetrating. Great attention therefore should be given to the lixivium, in order to extract all the salt of the kelp, and to use quicklime, which is absolutely necessary to render this lixivium caustic; a quality without which the oil cannot possibly form a combination with the alkali, consequently can make no soap.

In Europe the oil of olives is substituted instead of the oil of sesamum, which is used in the East-Indies and in Turkey, but the nature of these oils makes no difference in the operation. The oil of sesamum differs from the oil of olives only because it is thicker, consequently nearer to the nature of animal fat or wax; but the conclusion resulting from this difference is, that less of it may be required than of the oil of olives. Were the oil of sesamum absolutely necessary, it might have been easily procured. The sesamum is a species of fox-glove that grows in the Indies; but is cultivated in Italy, and especially in Sicily, where it is called *girolamus*. The name of the oil may be obtained from plants analogous; such as the gratiole, the henbane, &c. but the plant whose seed resembles it most is the convolvulus or lizeron.

It is certain that the processes brought from Adrianople might be greatly abridged; but we must leave the secret to those to whom it belongs: and I am beside convinced, that a memoir on this subject will be prefented to the Academy of Sciences, and therefore will not anticipate.

With regard to the sheep's dung and intestinalliquor, it is of no use in fixing the colour. But we know, that these substances contain a large quantity of volatile alkali quite developed, which has the property of robing the red colours. If the bones of animals owe to their tenacious gluten the facility of retaining so strongly the madder colour, the vivacity of this colour may be attributed, as from experience we learn,
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learn, to their volatile alkali. It were absurd to imagine that the Europeans only had discovered this phenomenon; as it may be rationally supposed that the Indians, having perceived it by accident, sought to imitate what chance had brought to their knowledge. It is certain, that in the red dye of the Maroquins, the procées of which was brought from the Levant, they prepared the goat skins for dyeing with dog’s excrement, having found it effective in exalting the dye of the lac.

In the dyeing of cotton thread, it is common to mix the sheep’s dung with a lixivium of fixed alkali; by which the volatile principle of the dung is retained, and consequently putrefaction prevented. By dipping the cotton several times in this foamy liquor, it is impregnated with the predominating alkaline principle; and we know by experience, that substances once impregnated with volatile alkali, for example chemical vessels used in extracting it for a long time, retain a smell very like the smell of muff, even after having been well scrubbed with sand, ashes, soap, &c. Every time the cotton is dried when taken out of this liquor, the evaporation of the aqueous particles (the alkaline principles being changed into earth) produces a stronger adhesion in the pores of the cotton. From the union of this earth with a portion of the oil employed, a lixivium than is necessary for its wetting is formed.

The following processes were taken from the manuscripts of M. Helliot. “According to the letters of M. Grainge, correspondent of the Royal Society, who died at Shiraz in Persia, June 1737, the dyers of the city of Damas dyed their crimson colour, so beautiful and so much esteemed in the east, in the following manner: Take ten rottes (a rotte weighs five pounds) of silk in skeins; wash it well in warm water; then let it soak in a sufficient quantity of hot water during half an hour; squeeze, out the water; dip it afterwards, but once only, in a hot lixivium, made with a sufficient quantity of water, half a rotte of kelp ashes for every rotte of silk, which is immediately drained on rods, taking care not to leave the silk longer in the lixivium than is necessary for its being well soaked, left the alkali should corrodce it.

Whilest the silk drains, they prepare another liquor cold with ten ounces of the pulp of yellow melon, very ripe, which is uniformly diffused in a sufficient quantity of water. They steep in this liquor the ten rottes of silk for twenty-four hours; they increase or diminish the quantity of the above drugs in proportion to the quantity of the silk to be dyed. The silk having remained one day in this melon liquor, is several times washed in fresh water till it becomes perfectly clean; they then hang it to dry. Mean while the workmen fill a large pan of water, adding a half rotte of alum powdered for every rotte of silk. The pan is then suspended over a hot furnace, and the liquor boiled during twenty minutes; after which the fire is taken from the furnace. The silk is then dipped in this alum solution, moderately hot, and again taken out as soon as it is perfectly wet. They then put it into another pan, pouring over it the alum solution, in which it remains four or five hours, but no longer. It is then taken out and several times washed in fresh water.

“Whilst the silk is washing, a workman fills a large pan with water, adding an ounce of bai-jung (fungus), finely powdered, for every rotte of silk; when this new decoction has boiled for half an hour, they add ten ounces of uades (cochineal), very finely powdered, for every rotte of silk; that is, six pounds four ounces of cochineal for ten rottes of silk. As soon as this cochineal is added, the fire is taken from the furnace. The liquor is then gently stirred round with a stick; and when the mixture is perfectly made, they pour gently and by inclination a little fresh water into the middle of the pan. The water thus added not only cools the dye, but makes it much more lively. They then immediately dip the silk four or five times, wringing after every dip. This tincture is afterwards boiled again for about a quarter of an hour, and the fire is then taken from the furnace as before. When the liquor is a little cool they dip the silk, still observing to wring after every dip. This done, they put the silk into an empty kettle, pouring over it the remainder of the dye, in which it is left to soak for twenty-four hours. It is then well washed in clean water, dried in the shade, and when very dry wove into fluffs. This crimson is much superior to all the French and Italian crimsons; because the silk was never boiled in the dye.

“Whilest the workmen are washing the silk, they prepare a new liquor cold with ten rottes of the yellow melon, which is immediately drained on rods, taking care not to leave the silk longer in the lixivium than is necessary for its being well soaked, then the alkali should corrode it.

As to the water necessary for the preparation of the silk with the kelp, melon, and the slum for the dye, it requires no more than a sufficient quantity for wetting the silk, namely, about a finger’s breadth over it, differing from the tincture, which as the skeins are dipped in this liquor at least ten or a dozen times, should be fuller in the kettle.

The kali used in the preparation of the silk is nothing more than the ashes of a plant called by the

Arab
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Arabs \\

"The frames used for these silks are similar to the frames used at Lyons.

"At Genoa the silks designed for crimson are boiled in a much less quantity of soap than those intended for any other colour, 18 or 20 pounds serving for a hundred pounds of silk in the crimson dye; for any other colour, the Genoese use 40 or 50.

"When the silk is boiled, it is dipped in the alum liquor; and to a quantity of raw silk, weighing 72 pounds, they put from 15 to 18 pounds of rough alum, finely powdered, into a copper full of cold water. When the alum is perfectly dissolved, the silk is put to soak in it for near four hours; it may remain longer without inconvenience, silk intended for crimson requiring more alum than for any other colour. When taken out of the alum liquor, it is shook and dried on the pegs, but without wringing. One of the dyers being questioned why the silk was not wrung when taken out of the liquor? answered, that it would purge it too much from an impregnation so absolutely necessary for its taking the crimson dye.

"Of the 72 pounds of silk already mentioned, 32 pounds is organzine, and the remaining wool. At Genoa it is the custom to allow two ounces of cochineal to twelve of organzine, if designed for the warp of damask furniture, and for the same silk an ounce and three quarters of cochineal for 15 ounces of the woof, supposing the quality of the silk as well as the beauty of the silk that the warp should be fuller than the woof; and to bring the colour of the damask to still more perfection, they add to the organzine a quarter of an ounce of cochineal, that is, instead of two ounces they add two ounces and a quarter, adding no more to the woof than one ounce and three quarters.

"As the above 32 pounds of organzine should be of the finest colour, they allow two ounces and a quarter of cochineal to every pound of silk; so that upon the whole they use 142 ounces of cochineal, or 11 pounds 10 ounces, Genoa weight; namely, 32 pounds of organzine to two ounces of cochineal, making 72 ounces; 40 pounds of wool to one ounce and three quarters, making 70 ounces. Total 142 ounces.

"In order to dye this 72 pounds of silk, almand as above, they make use of an oval copper containing when full 200 quarts of water; they fill this copper two-thirds full of clear fountain water, adding afterwards the following drugs pounded and sifted. Two ounces of tartar, two ounces of saffranum, and two pounds and a half of the Levant galls.

"They wait till the drugs have boiled two minutes in this liquor; after which they add the 11 pounds 10 ounces of cochineal finely powdered and sifted; and whilst one of the workmen by degrees makes it sink to the bottom, another keeps violently stirring the liquor with a stick to promote the solution.

"This done, they fill the vessel with clean water to about a foot of the edge, immediately afterwards dipping the 32 pounds of organzine, divided on 14 rods. They let it remain till the vessel which they fill with clean water, and under which they put a large fire, is ready to boil; they then, to make the silk take the colour more evenly raise the rods without ceasing, one after another, that each may alternately reach the bottom of the copper, which being but two-thirds full, the upper part of the silk would else remain out of the liquor, the rods being supported on the edge of the copper.

"When the liquor was ready to boil, the forty pounds of woof, divided on 16 rods, were dipped; they still continuing to raise the rods, one after another for half an hour, both the organzine and the woof, that each may alternately reach the bottom; so that when the workman came to the last he returned to the first, and so on successively.

"After the first half hour, they stopped for a quarter of an hour between every operation, the workmen still raising the rods from the first to the last, five or six times repeated in the space of an hour and an half; all the time keeping a good fire under the copper. The organzine was then steeped in this liquor two hours and a quarter, and the woof only two hours. The fire was then taken from under the copper; and the workman taking out one dip of the organzine and another of the woof, he wrung and dried them as much as he could to see if the colour was what he wished; if not sufficiently deep for the purpose, he let them both remain in the liquor something less than half an hour whilst the liquor was growing cold. He then took out all the silk, wrung it on the peg, then washed it several times in clean water, changing the water every time. This done he wrung it again on the pegs, and so finished the operation.

"It must be observed with regard to the organzine and woof, that though dyed in the same liquor, they were not however of the same shade at the conclusion of the operation; the organzine was deeper, having been a quarter of an hour longer in the cochineal liquor, during which time it was impregnated with the more subtle colouring particles of the cochineal.

"At Genoa it is not the custom to wash the silk out of the cochineal with soap water; on the contrary, they are perfumed that this practice dulls the brightness of the colour, and that the water, both for the cochineal liquor and for washing afterwards, should be the sweet spring-water; for they remark, that the crimson dyed in summer with eifern water, is by no means so bright as the crimsons dyed at other seasons when the fountains are full.

"According to the dyers of Genoa, there is a kind of cochineal which though apparently beautiful, is not so in effect; that in using this cochineal it is necessary to alman the silk as much as possible, and to add to it more tartar than before mentioned. It is, however, impossible to give any certain rules concerning this matter, the dyer himself will judge of the quality of the cochineal fit for use. He should however use the best; for were it even a fact that the inferior kind, with the assistance of a greater quantity of alum and tartar, gives a colour equal to the best; the silk thus weakened by alum would necessarily be always less perfect. The Genoese manufacturers are so well convinced of this, that they themselves furnish their dyers with cochineal in proportion to the silk given to be dyed."
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After the operations of dyeing scarlet and crimson already mentioned, there always remains a brown sediment in the bottom of the liquor, which is thrown out as refuse. This, on being examined by M. Heliot, was found to be a precipitated calx of tin, as he has ascertained by reviving the metal from it, though without great trouble, so that there can be no advantage in repeating his experiments. The remainder of this sediment was composed of the dregs of the cream of tartar united with the gross animal particles of the cochineal. The juice being washed over with water, and thus separated from the earthy and metallic parts, were dried separately, and afterwards bruised with an equal weight of crystals of tartar; after which they were ground to an impalpable powder, and boiled with a little alum. Thus they communicated a fine crimson colour to a pattern of white cloth; from which our author is of opinion, that the custom of reducing cochineal to powder and only sifting it, does not give an opportunity of sufficiently extracting the colour from this valuable material; he therefore gives the following receipt for doing so in a more perfect manner. "To an ounce of cochineal powder and sifted as usual, he adds a fourth part of its weight of very white, clean, and dry cream of tartar. These being ground together on a marble stone to an impalpable powder, and boiled in the preparation and in the dye, omitting the small quantity of crystals of tartar formerly directed for the preparation." The quantity here directed to be put to the cochineal, he thinks, evidently renders the colour more fixed.

For madder red the preparation is pretty much the same as for kermes, and is always made with alum and tartar. Dyers are not agreed with regard to the proportions. M. Heliot puts five ounces of alum and one of red tartar to every pound of worsted, adding likewise a twelfth part of four water, and boiling the wool in this solution for two hours. Worsted is to be kept for seven or eight days moist with this solution, but cloth is finifhed in four days. A fresh liquor is prepared for dyeing this wool; and when the water is sufficiently hot to bear the hand in it, you must throw in, for every pound of wool, half a pound of the finest madder, carefully stirring and mixing it well in the copper before you put in the wool, which is to be kept in for an hour; but without letting it boil, as that would tarnish the colour. Nevertheless, for the dyer’s security, it may boil for three or four minutes at the end of the operation; but the more that madder is boiled, the worse is the colour it yields.

The third primitive colour spoken of among dyers is that of yellow; and for this M. Heliot observes, that there are ten different ingredients fit for the purpose, though only five of them yield a good and permanent dye. These are weld, savory, green-wood, yellow-wood, and fenugreek.

"Weld or weld generally yields the truest yellow, and is therefore preferred to all the others. Savory and green-wood, being naturally greenish, are the best for the preparation of wool to be dyed green; the two others yield different shades of yellow.

"The shades of yellow, best known in the art of dyeing, are straw colour; pale yellow, lemon colour, and full yellow. The common orange colours are not simple, and therefore we shall not speak of them at present.

"For dyeing worsted and stuffs yellow, you make Worsted or worsted wool with the usual preparation, viz. of tartar and alum, wool. You allow four ounces of alum to every pound of wool, stuffs. or 25 pounds to every 100. With regard to the tartar, one ounce to every pound is sufficient for yellow, though it requires two for red. The method of boiling is similar to the preceding. For the welding, that is to say for yellowing, when the wool or stuff has boiled, you make a fresh liquor, allowing five or six pounds of weld to every pound of stuff; some inclose the weld in a clean woolen bag to prevent it from mixing in the stuff; and to keep the bag down in the copper they put on it a crof of heavy wood. Others boil it in the liquor till it has communicated all its colour, and till it falls to the bottom; the stuff is then suspended in the net, which falls into the liquor; but others, when it has boiled, take out the weld with a rake, and throw it away. They sometimes mix yellow wood with this weld; and some dyers mix any of the other ingredients before specified, according to the shade required. By varying the proportions of the salts for the preparation, the quantity of the colouring ingredients, and the time of boiling, it is possible to produce an infinite variety of shades.

"For regular shades of light yellows you proceed as for all other regular shades, only that light yellows require a weaker preparation. For example, 12 pounds and a half of alum to 100 pounds of wool is sufficient. The tartar should also be diminished, because the wool is always wafted a little by the preparation, and that when you require only light shades they may be as easily obtained by a weaker preparation; thus you save also in the expense of the salts.

But these light shades do not so well stand the test as the darker shades, which are dyed with the full proportion of tartar. Some dyers suppose, that by letting their wool and stuff remain longer in the dye, they remedy this evil; because they imbibe the colour more slowly in proportion to the weakness of the decoction: if you put weld into the dye, differently prepared, it will in the same time imbibe different shades. These weaker preparations are called half preparations or quarter preparations, and require great attention, especially for light shades of wool when dyed in the fleeces for the manufacture of cloth and mixt stuffs, because the wool is harder and more difficult to spin in proportion to the quantity of alum in the preparation; the stuff is consequently less fine. This observation is not, however, of much importance with regard to worsteds for tapestry, neither with respect to stuffs; but it is not much amiss were it only to show that the quantities of the ingredients used in the preparation are not so very exact; but that they may be varied without any risk, whether to give to the same shades to wool prepared in different preparations, or whether to make but one preparation, if more convenient for different shades.

"In order to dye with yellow wood, it should be split, or rather shaved with a joiner’s plane: by this means it is more divided, consequently yields better, so that a smaller quantity will do. Prepare it as you will, it should always be tied up in a bag, to prevent it from mixing with the wool, and from tearing the stuff.
To dye silk of a yellow colour.

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For dyeing silk of this colour it should have about 20 pounds of soap for every 100 of stuff; and after boiling with this ingredient, it should be washed, alumed and washed again (which is called refreshing), when it is to be put upon the rods in hanks of about seven or eight ounces, and then dipped and returned in the yellow liquor. The finest yellow for silk is weld; and the process, as delivered by M. Macquer, is as follows:

A copper is prepared with about two pounds of weld to every pound of silk; and that all the weld may be well soaked, it is loaded with a large piece of wood. When it has boiled a good quarter of an hour, the bunches are pulled to the far end of the copper, or rather, if you please, taken out; and by means of a bucket or ladle all the liquor may be taken out of the copper and strained into a copper or wooden trough; that is, by putting a sieve or linen cloth across a trough; by which means the liquor is cleansed from all the grain and little straws left by the weld in boiling. The liquor thus strained is left to cool till you can bear your hand in it; the silk is then dipped and returned till the colour becomes uniform. If this boiling does not make sufficient to fill the trough, it must be supplied with water, which should be added before the liquor is cold, that the degree of heat already mentioned may be preferred. In general, all dyeing vessels should be full, that the silk when dipped may be only two inches from the edge.

During this operation the weld is a second time boiled in fresh water; and when it is boiled, the silk should be raised at one end of the trough, either up on a kind of barrow, or upon the edge of the trough. Half the liquor is then thrown away and replenished by adding of the second boiling as much as was taken from the first, observing to rake and mix the liquor well: such is generally the method when any new addition is made; at least if the contrary is not particularly specified. This new liquor may be used rather hotter than the first; it should never be always of a moderate heat, because otherwise it would destroy a part of the colour which the silk had already taken, probably owing to the silk being deprived of part of the alum by the heat of the liquor. The silk is returned in this fresh liquor as at first; mean while you prepare a solution of pearl-ash in proportion of about one pound to every twenty pounds of silk.

For this purpose the pearl-ash is put into a copper, and the second liquor, quite boiling, poured on it, stirring in order to afflit the dissolving of the salt. This small liquor is left to subside, and the silk is a second time raised on the barrow or trough, throwing into the liquor about two or three ladies of the clearer of the solution. The liquor is then well raked, the silk replanged, and again returned. This alkali develops and brightens the yellow of the weld. After seven or eight returns, one hank is wrung to try if the colour be full enough and sufficiently bright; if deficient, a little more of the solution of the ashes must be added, and the remainder of the silk done in the same manner till it has taken the shade required. The lixivium, separately prepared, may be added, if you will, at the same time with the second boiling of the weld-liquor; care should be taken however that the liquor be not too hot. This operation is only for yellows, nor would the liquor do for greens.

For yellow still fuller, approaching to jonquil, when the pearl-ash is added, it may be also necessary to add some rocou, in proportion to the shade required.

For the light shades, such as pale lemon or Canary-bird, they should be boiled in the same manner as for blues, these shades being much more beautiful and transparent when dipped in a clear ground. To do this, when the weld is ready to boil, some of the liquor should be taken out and mixed with a little clean water and a little of the liquor of the vat if boiled without azote. The silk is then dipped as usual; and if deficient in shade, the weld liquor must be re-added, and the dipping repeated, if necessary, to complete the shade required.

For deeper lemon colours the weld should boil as for yellows, adding only a certain quantity with clean water, according to the fulness of the shade required: some of the liquor of the vat may be added if necessary; but these dark lemon colours may be boiled in the common way as for yellows. It must be observed, however, that the blue of the vat is never added to these colours but when it is intended to give them a greenish cast.

These very pale yellow shades are rather difficult as they are very frequently liable to be affected by the air, and to deepen too much while drying. This happens when alumed in the common way, which is too much; but this inconvenience may be avoided, if instead
Dyeing.

To dye cotton yellow.

Cotton to be dyed of a yellow colour should be first well cleaned in a lixivium of fresh wood ashes, and afterwards well washed and dried. Another liquor is then prepared by dissolving in the water, when ready to boil, about a quarter the weight of the substance to be dyed of Roman alum. The skins are plunged into this alum liquor, returning them on the rods for some minutes. When equally penetrated throughout, the threads by which the skins are tied being passed on the rods, the hanks are laid on the trough containing the alum liquor. The copper or trough is then prepared by dissolving in the water, when ready to boil, about a quarter the weight of the substance to be dyed.

A strong weld liquor is afterwards prepared, adding for every pound of the substance to be dyed a pound and a quarter of weld. The cotton or thread, having been previously alumed, is then immersed; the boiling checked with cold water, and the substance worked till it has taken the shade required.

The whole when dyed is plunged into a very hot liquor, but not boiling, made of blue vitriol, a quarter of a pound for every pound of the substance. When it has remained for about an hour and a half, the whole, without washing, is thrown into another liquor compos'd of about a quarter of a pound of white loof for every pound of the substance. Having been well worked and the threads opened, it should boil for three hours or more if you think proper. The soap might be diminished to half the quantity, but the full proportion does better. This operation finished, the whole is well washed and dried.

If you desire a dark or jonquil yellow, neither the linen nor cotton should be alum'd; but for every pound of thread should be added two pounds and a half of weld. When it has been dipped and well worked in this liquor till it has taken the colour equally, it is raised above the liquor, and half a pint of the kelp lixivium poured into it, made as directed in the article upon red. The thread is then returned upon the rods, dipped in this liquor; where having remained for a full quarter of an hour, it is taken out, wrung, and dried.

The lemon yellow is done after the same manner, only that for every pound of thread you put but one pound of weld, diminishing the verdigris in proportion, or even omitting it entirely by sublimateing in its place the alum liquor. By this means the yellow shade may be varied ad infinitum, and without any difficulty; in brightening and fixing the colour, however, the above method must always be observed.

Cotton-velvet is dyed with the root of a plant called currum or terra merite, a species of raph which comes from the East Indies. It gives a beautiful yellow colour; but if dyed in the common manner has but little solidity. The colour, according to M. de Apligny, may be fixed upon cotton or linen thread by dipping them in a solution of sulphur of antimony in the kelp lixivium already mentioned. When treated in this manner it is very beautiful as well as permanent.

The fourth primitive colour so called among the dyers, is that which bears the appellation of fawn or root colour. It is however a kind of brown, and has the name of root-colour from being an ingredient in a great number of others. The process for dyeing it is different from those lately described; the wool requiring no other preparation than that of being soaked in water, as already directed for blue. The materials for dyeing it are the green shell of the walnut, the root of the walnut tree, the bark of the alder, fanta, fumach, roudoul or fovie, and foot.

The green shells of the walnut, collected when the nuts are perfectly ripe, and put into tubs or cafs, and afterwards filled with water, are in this manner preferred till the year following. The shells are also used before the nuts are ripe; but these should be saved apart, in order to be first used; because as the soft shell which adheres putrifies, it will keep but for two months only.

The fanta or faundersis a hard wood imported from the Indies, generally ground into a very fine powder, and preferred in bags; because it is supposed to ferment, by which it is thought to be greatly improved; but our author has never observed any difference. This ground wood is generally used with one-third of cafrate wood; by which, in the opinion of those who prepare it for sale, it is much improved. It is however nothing like so good as the walnut shells; because, if used in too large a quantity, it flattens considerably, and thereby injures the wool; hence it were better not to use it, either for wool or fine stuffs, except in the lighter shades, where it would not have so bad effect. It is generally mixed with galls, alder bark, and sumach, as by this means only you can obtain its colour when not mixed with the cafrate. It yields but very little with the preparation of alum and tartar, especially if it be not chipped; but notwithstanding these defects, it is used on account of the solidity of its colour, which is naturally a yellow red brown. The air makes it deeper, and soap lighter. It loses but little by a trial of alum, and still less by tartar.

Of all the ingredients for dyeing fawn colours, the walnut rind is the best. Its shades are finer, its colour solid; and by making the wool flexible, renders it less difficult to work. It is prepared in the following manner. You fill a cauldron half full of water, and when it grows warm, you add rinds in proportion to the quantity of stuffs to be dyed and to the colour required. It is then boiled; and when it is boiled for a quarter of an hour, the stuffs, having been previously moistened with warm water, are dipped; they are then turned and well stirred, till they have imbibed the colour desired. If for worsteds, requiring an exact affection of shades, you put less walnut rinds, and begin with the lightest shades. You put more walnut rinds in proportion as the colour is exhausted, and then dip the darkest shades. With regard to fluffs, you ge-
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generally begin with the deepest, and as the colour of the dye diminishes, you dip the lightest. They are aired as usual, dried, and dressed.

The root of the walnut tree is, next to the husk, the best dye for fawn colour: it also gives a very great number of shades nearly resembling those of the husks; hence they may be substituted for each other, but the root requires a different process. You fill your cauldron three quarters full of river water, putting in the root, cut small, in proportion to the quantity of wool to be dyed, and to the shade required. When it is very hot, you dip the wool or stuff, turning and returning it as before, remembering to air it from time to time; and, if stuff, to draw it through the hands in order to shake off the small bits of the root, which might else spot the stuff. To avoid these spots, the root should be tied in a bag. You afterwards dip the lighter stuffs, and so on, till the colour of the root is exhausted. If worsted, you always begin with the lightest, as for other colours; but of all things you must be careful to keep your liquor from boiling at the beginning, as in that case the first piece of stuff would imbibe all the colour.

The method of dyeing with roots is not very easy; for if you are not very attentive to the degree of heat, to turning and returning of the stuffs or worsteds, so as to dip them equally, you run a risk of their being either too dark or spotted, for which there is no remedy. In this case, the only recourse is to dye them marone, prune, or coffee colour. In order to avoid this evil, you must keep the stuffs continually turning on the reel, and dip them only piece by piece, nor let the liquor boil till the root has yielded all its colour. The worsteds or stuffs dyed in this manner, should be aired, well washed, and dried.

Nothing more can be said concerning the bark of alder, than what has been already observed with respect to the root of the walnut tree, only that letting it boil at the beginning is not of so much consequence, because it yields its colour less freely. It is generally used for worsteds and colours darkened with copperas. It nevertheless produces a good effect on wool not intended for colours extremely dark, and perfectly withstands the power of the air and sun. Here we shall describe also the manner of dyeing with foot, though it has less solidity than the others, with foot.

With regard to the mixing of these ingredients with ground fumac, you put four pounds of the latter into a cauldron of a moderate size, half a pound of nut galls pounded, twelve pounds of alder bark, and ten pounds of sumach (these quantities will dye 25 or 27 ells of cloth). The whole is boiled; and having checked the boiling with a little cold water, you immerse the cloth, turning and resifting it for two hours: it is then taken out, aired, and washed in the river. You afterwards dip some more stuff in the same decoction, if you want a lighter shade; and in this manner you may contrive as long as the liquor retains any colour. The quantities of these ingredients are augmented or diminished in proportion to the depth of the shade required, letting the wool or stuff boil accordingly.

Here we shall describe also the manner of dyeing with foot, though it has less solidity than the others, with foot.

and has also the property of hardening the wool, and giving the stuff a very disagreeable smell.

The foot and water is generally put into the copper at the same time, and the whole well boiled. The stuff is then immersed, and more or less boiled according to the shade required; it is afterwards taken out and cooled, and those intended for the lightest shade are then put in; they are afterwards well washed and dried. But the best method is to boil the foot in the water for two hours, to let it stand afterwards, and then to empty the liquor into another copper, without mixing the foot. The wool and stuffs are then dipped in the liquor, and are thereby less hardened than if they had been mixed with the foot: but this does not render the colour more permanent; and indeed it were better never to make use of this ingredient, except for stuffs of little value, especially as it can be supplied by other ingredients already mentioned, which give a better and more lasting colour, and are besides more softening to the wool. In the dye they frequently employ the green walnut shell, and the root of the walnut tree for their fawn colours. These two substances are useful both for the greater and less stuff; there are, however, places where it is difficult to meet with them, and where they are therefore obliged to make use of saunders and even of foot.

Nothing more can be said concerning the bark of alder, than what has been already observed with respect to the root of the walnut tree, only that letting it boil at the beginning is not of so much consequence, because it yields its colour less freely. It is generally used for worsteds and colours darkened with copperas. It nevertheless produces a good effect on wool not intended for colours extremely dark, and perfectly withstands the power of the air and sun.

Sumach is nearly of the same nature, and is used in the same manner as the husks: its colour is not so deep, and is rather greenish. It is for dark colours frequently substituted for nut galls; but a greater quantity is requisite. Its colour is also perfectly solid and permanent. These different substances are sometimes mixed together; and as they are equally good, and produce nearly the same effect, there is no great difficulty in obtaining certain shades. We must, nevertheless, be directed by custom in the production of these fawn colour shades, which absolutely depend upon the eye, and which are not difficult to manage.

The last of the primitive colours so called by the Of dyeing dyers, is black; which includes a vast number of black shades, from the lightest grey or pearl-colour to the deepest black. Hence it is ranked among the primitive colours in dyeing; for among dyers the word primitive does not denote simplicity, but only being the original colour from whence a number of others are derived. In order to dye woollen stuffs of a good black, they should first be dyed a sort of mazarine blue as deep as possible; which is called the base or ground, and is to be performed in the manner already directed. The stuff ought to be washed well in running water as soon as it comes out of the vat; and afterwards scoured at the fulling mill; which operation is of the utmost consequence, because without it the subsequent colour will be greatly injured by the lime in the liquor for dyeing blue. This being done, the colour is finished in the following manner. For 100 pounds of cloth put into a cauldron of a moderate size, ten pounds of logwood, cut into chips, and ten pounds of Aleppo galls pulverised, the whole encased in a bag: these ingredients are boiled in a sufficient quantity of water for 12 hours. A third part of this liquor is emptied into another cauldron, with two pounds of verdigris; the stuff is then entered and turned for two hours without ceasing. It is necessary to observe that this liquor should boil very slowly, or it is still better to keep it very hot without boiling. The stuff is then taken out, and the second third of the liquor thrown into the copper to the first third, with the

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addition of eight pounds of copperas. The fire under the cauldron is diminished, and the copperas left to dissolve for half an hour, letting the liquor, cool, after which the stuff is kept turning an hour; it is then taken out and cooled. The rest of the liquor is then mixed with the two third parts, carefully squeezing the bag well. To this is added 15 or 20 pounds of sumach: you give it another boil, and then cool it with a little water; having previously added two pounds more of copperas, you again turn the stuff for two hours; it is then taken out, cooled, and again put into the cauldron, turning it constantly for an hour longer.

After this it is carried to the river, well washed and scourred at the fulling mill. When it is thoroughly scourred, and the water comes out of it clear, you prepare a fresh liquor with as much wood as you think proper; you give it one boil, cool it, and dip the stuff. This last decoction softens and confirms it a very fine black. For the most part, however, they do not take so much pain; but are satisfied, when the stuff is blue, to dip it in a decoction of nautgalls, and to let it boil for two hours. It is afterwards washed, and some copperas and logwood added to the liquor; after which the stuff is again dipped for two hours, and then washed and scourred.

It may be also dyed in the following manner: for 15 ells of cloth, previously dyed blue, M. Hellet had a pound and a half of yellow wood, five pounds of logwood, and 10 pounds of sumach, put into a cauldron. In this the stuff boiled for three hours; after which it was taken out, and 10 pounds of copperas thrown into the copper. When the copperas was dissolved and this gall, according to the workmen's phrase, that is, it blackened it, or properly speaking rather to form an ink on the stuff, it requires a securit of a secret for dyeing a much finer black than any of their fraternity; this, however, consists in augmenting or diminishing the quantities of the same ingredients, or in substituting others which produce the same effect. M. Hellet has tried several methods; but supposes that what is chiefly meant by succeeding to perfection, depends rather on the manner of working, cleaning, and airing the stuff properly, than upon the exact quantity of the ingredients.

It may not, in this place, be improper to explain the reason of the necessity of giving stuffs a blue, or at least necessary a root-colour ground, previous to their being dyed black; and why the dying white black is expressly prohibited in France, because in that case it is necessary to use a much greater quantity of nautgalls: this would indeed be no great evil, as nautgalls of themselves do not injure the wool; but in order to overcome this gall, according to the workmen's phrase, that is, to blacken it, or properly speaking rather to form an ink on the stuff, it requires a greater quantity of copperas, which not only hardens the stuff, but, from the acidity impressed on the fibres of the wool by this salt, makes it brittle; on the contrary, when the stuff has had a ground, that is to say, a strong layer of some deep colour, there is much less occasion for either.

Blue is preferable to any other colour: first, because it is the nearest to black, which is in fact only a deep blue; and, secondly, as there is no occasion for any other preparation than previously boiling the wool, the stuff is in no respect injured. For the same reason, viz. the preservation of the wool, the root-colour is substituted for inferior stuffs instead of the blue, which would enhance the price; it is therefore necessary that this root-colour ground should be as deep as possible; because the darker it is, there is occasion for less copperas to complete the black.

It also frequently happens, that when stuffs of any colour are badly dyed or spotted, they are dipped in black: it is however advisable to dip them first in blue, unless the colour be very dark, in which case they would take a very fine black; but this is the last resource. These stuffs are not commonly dyed black if it be possible to make them any other colour; because, having been prepared with alum and tartar for the first colour, the copperas requisite for the black would considerably injure and greatly diminish their quality.

The shades of black are greys, from the darkest to How to the lightest. They are of great use in the art of dyeing, as well for their own colours, as when applied...
DYINGING.

plied to other colours, which is called darkening. At present we shall mention two methods of producing them. The first and most general is to boil some pounded nutgalls with a proper quantity of water for two hours; at the same time dissolving some copperas in a little water separately. Having prepared a cauldron of liquor sufficient for the quantity of wool or stuff to be dyed, you add to it, whilst the water is too hot for your hand, a little of the decoction of the nutgalls with the solution of copperas. The stuff intended for the lightest grey is then dipped. When sufficiently coloured according to your desire, you add some fresh decoction of nutgalls with some of the infusion of the copperas, and then dip the next shade. In this manner you proceed to the darkest shade, constantly adding these liquors, from tawny grey even to black; but it is much better to give the tawny grey and the extreme dark shades a blue ground, more or less as you like, for the reason abovementioned.

The second method for producing grey seems to be preferable; because the juice of the gall is better incorporated with the wool, and you are thereby sure of using no more copperas than is absolutely necessary. It even appears that the greys are more beautiful and the wool brighter. It also appears to be equally solid; for they are both of them equally proof against the air and sun. The second method is much less prejudicial to the quality of the wool, and is attended with no more difficulty than the first.

You boil a sufficient quantity of nutgalls, well pounded and inclosed in a clean linen bag; you afterwards put the wool or stuff into this liquor, letting it boil for an hour, moving and stirring it about, after which it is taken out. You then add to the same liquor a little copperas dissolved in a part of the solution, and then dip the woolens intended for the lightest shade. You again add a little of the copperas solution continuing in this manner as in the first operation till you come to the darkest shades. In either processes, if not restrained by patterns, you may catch the precise shades, beginning with the dark and finishing with the light, in proportion as the liquor becomes exhausted of its ingredients; keeping the pieces of stuff or wool immersed for a longer or shorter time, till the stuff takes the colour desired.

It is impossible to determine the quantity of water necessary for these operations, as it is to specify the quantity of the ingredients, or the time for letting the wool remain in the liquor. The eye must judge of these things. If the liquor be strongly impregnated with colour, the wool will imbibe the shade in a shorter time; but, on the contrary, it must remain longer if the liquor be exhausted. When the wool is not dark enough, it is dipped a second time, a third, or even more, till it is of a sufficient colour; the only necessary attention is to prevent the water from boiling. If it be by chance too deep, the only remedy is to dip the stuff in a fresh warm liquor, adding to it a little of the decoction of nutgalls. This liquor carries off a part of the precipitated iron of the copperas; consequently the wool or stuff becomes lighter.

But the best way is to take it out of the liquor from time to time, not leaving it in long enough to imbibe more of the colour than required. It may also be dipped in a solution of soap or alum; but these corrections destroy a great part of the colour, so that it is often necessary to darken it again; by this means the wool, which suffers greatly by the reiterated action of these ingredients, is injured. All greys, however dyed, should be well washed in a large stream, and the darkest even scoured with soap.

These dingy shades, from the lightest to the darkest, are produced by the same operation from which common ink is obtained. The green vitriol contains iron; were it blue, it would contain copper. Pour a solution of this green copperas into a glass, holding it in the light and dropping into it some of the decoction of nutgalls. The first drops that fall into this limed solution of ferruginous salt produces a reddish colour, the next turns it bluish, then a dusky violet colour, and at last it becomes a dark blue, almost black, which is called ink. To this ink add a quantity of pure water; let the vessel rest for several days, and the liquor by degrees becomes clearer and clearer, till it is almost as limpid as common water, and at the bottom of the vessel you will perceive a black powder. Having dried this powder, put it into a crucible; calcine this, and put to it a little flux or any other fat, you will obtain a black powder which may be attracted by the lodestone. This, therefore, is iron; this is the metal which blackens the ink; and this, when precipitated by the nutgalls, lodges in the pores of the fibres of the wool, diluted by the heat of the liquor, and contracted when the stuff is exposed to the air. Besides the flyptic quality of the nutgalls, by which they have eminently the property of precipitating the iron of the copperas and producing ink, they also contain a portion of gum, as may be ascertained by evaporating the filtered decoction. This gum being introduced into the pores with the ferruginous atoms serves to retain them; but this gum being easily soluble, it has not the tenacity procured from a salt more difficult of solution; therefore these dark colours have not the solidity of other solid colours prepared in a boiling solution of alum and tar, and therefore plain greys have not been submitted to the usual trial.

It is by no means easy to produce a good black colour on silk, though the basis is undoubtedly the dyed silk of fame, viz. iron dissolved by acids, and precipitated a black colour on the cloth by a vegetable astringent. The following processes is given by M. Macquer. "Twenty quarts of vinegar are put into a trough with one pound of black nutgalls pounded and sifted, and five pounds of fresh iron-fillings. While the infusion is making, you clean out the copper in which you put the black ground, with the following drugs pounded, viz.

8 lb. of black nutgalls | 3 lb. of agaric
8 — of common | 2 — of cogue de Levant
4 — of fumach | 10 — of buckthorn
12 — of pomegranate rind | 6 — of linseed
4 — of bitter apple

"These several drugs are put into a copper, containing half the quantity of the vessel used for the black ground, and filled with water. Twenty pounds of Campeachy or logwood chips are afterwards inclosed in a linen bag, for the convenience of taking them out..."
of the liquor, unless you choose to take them out with a pierced ladle, or any other means, because these must boil a second time as well as the other drugs.

When the logwood has boiled for about a quarter of an hour, it is then taken out and properly preferred. The abovementioned drugs are then put into the logwood decoction, and also boiled for about a quarter of an hour, carefully checking with cold water as often as it seems ready to boil over.

This operation being finished, the liquor is strained through a linen strainer into a trough, and then left to settle, carefully preferring the grounds which must be again boiled.

The cold infusion of the vinegar with the nutgalls and iron filings is then put into the copper intended for the black ground. The fire is afterwards put under it, and the following ingredients immediately added, viz.

<table>
<thead>
<tr>
<th>20 lb. of gum arabic pounded</th>
<th>2 lb. of green copperas pounded</th>
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<tr>
<td>3 lb. of realgar or red arsenic</td>
<td>2 lb. of the scum of sugar candy</td>
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<tr>
<td>1 lb. of ful ammoniac</td>
<td>10 lb. of powder sugar pounded</td>
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<tr>
<td>1 lb. of fial galls</td>
<td>4 lb. of lighthouse pounded</td>
</tr>
<tr>
<td>1 lb. of mineral crystal</td>
<td>5 lb. of antimony pounded</td>
</tr>
<tr>
<td>1 lb. of white arsenic</td>
<td>2 lb. of opiment pounded</td>
</tr>
<tr>
<td>1 lb. of corros. sublimate</td>
<td>2 lb. of plumbago pounded</td>
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These several drugs should be pounded and sifted, except the gum arabic, which is only broken.

Instead of gum arabic the native gums may be used, and dissolved in the following manner: Some of the logwood decoction is put into a boiler; when hot, you put into it a copper strainer, made in the shape of an egg, and open at the largest end. The gum is put into this strainer, and dissolves as the liquor heats; it must be stirred with a wooden pestle, that it may pass through the holes. When it is entirely passed, you introduce another copper strainer, with holes still smaller than the former, to prevent the impurities of the gum from escaping. The liquor of the gum already dissolved is poured into this strainer, and again passed as before by the agency of the pestle. This operation is made more easy, by now and then taking out the strainer andrita

When the liquor is hot enough, you take away the fire, strewing over the liquor with the iron-filings, and letting it stand for three or four days.

Two pounds of verdigris are then pounded and dissolved with six quarts of vinegar in an earthen pot, adding to it about an ounce of cream of tartar. The whole should boil for a full hour, taking care to check the boiling with cold vinegar that it may not boil over. This preparation should be kept ready to be added to the black ground when you are going to dye.

For the black dye the silk is boiled as usual; having washed and beeted according to custom, you give the gall liquor for heavy blacks twice, but for light blacks only once. These two blacks are alike both in beauty and shade, differing only in the weight of the silk: the light black has, however, rather more lustrous.

The nutgall liquor is made as follows: For every pound of silk you must have three-quarters of a pound of light nutgalls, adding the same quantity of Aleppo. These galls are pounded together, and boiled for two hours in a quantity of water sufficient for the whole of the silk to be galled. As the liquor wafts a great deal in the boiling, it is, after the first hour, filled again, and after two hours the fire is taken away; the liquor is then left to depose, and the galls taken out with a pierced ladle; about an hour afterwards the silk is put into it, prepared as above.

During this operation the silk is drained and very lightly squeezed: it is then immersed in the gall liquor, on cords one above another, taking care to keep it near the surface of the liquor, but sufficiently covered. In this manner it should remain 12 or 15 hours; it is then taken out, washed at the river, and if intended for heavy black, is a second time galled in a fresh galling like the first; the grounds are generally used for the first galling; but for the second a liquor of fresh drugs.

Some dyers gall the heavy blacks but once, by boiling the old grounds, taking them out immediately, and afterwards adding fresh galls; for every pound of silk a pound of light gall and half a pound of fine Aleppo. The fresh galls they boil for two hours or more, and when the grounds are taken out they put the
"DYEING.

The silk in the fresh gall liquor, where they let it remain a day and a night.

"This method, they say, is the best; because, were the gall grounds to remain in the liquor, they would imbibe part of the substance which they had before given to the water.

"When the silk is called, a little fire is put under the black ground; while it is heating, the silk is wrong out of the galling, and becketed at the river.

"When washed it is drained on the pegs, passing a thread round every hank, each hank as large as for common colours: it is then immediately put on the rods.

"While the black liquor is heating, it should be stirred with an iron rake or paddle, to prevent the grounds from sticking to the bottom of the copper. You then dissolve some French gum by the method above described, till it rises on the top in a kind of scum covering the surface of the liquor; afterwards you throw into it two or three handfuls of linseed. You then add half of the vinegar and verdigris preparation with about four or five pounds of copperas; this should be punctually repeated at every heating.

"Care should be taken while the fire is under the copper to rake; and, to try if it be hot enough, the rake is moved round at the bottom of the copper; if the gum sticks to the rake, and the liquor does not appear through the middle of the gummy scum, it shows that it is hot enough: the fire is then taken away, because, as we have before observed, it should not boil. The rake is then also taken out, and the liquor covered with iron-filings in the same manner as before; after this it is suffered to subside for about an hour, when the surface of the liquor is again stirred, in order to precipitate the filings to the bottom.

"Before we explain the manner of dipping silk in the black liquor, it is proper to observe that silk dyers never dye black but by copperas, that is when they have a sufficient quantity of silk for three dips, if for heavy black; but if light black only two dips, which is done in the following manner:

"If heavy black, a third of the silk is put upon the rods, and three times returned in the black ground; it is afterwards wrung on the peg over the copper; this is done by giving it three twirls; in this manner three hanks may be wrong at once, because it should be done gently, and only to drain; it is again put on the rods, and furnished between two perches to air.

"While the first silk is airing, the second third part is dipped in the same manner, and afterwards the third third part, always in the same manner. It must be remembered, that while the silk is on the rods it should be turned from time to time to give it air.

"When the last third part is wrung, the first part is put in, and then the two others successively for three times, always airing at each time. This is commonly called giving the three wrings, and these three wrings are called one fire or heating.

"The light blacks should also have three wrings to one fire.

"After each fire the black ground is again heated, adding copperas and gum as before. This operation is thrice done for the heavy blacks, that is three fires, each fire confining three wrings; but for light blacks only twice, each also confining of three wrings.

"It must be observed, that at every reheating it is requisite to change the order of dipping, in such a manner that each may in its turn have the first of the liquor. If the black dye is strong and good, the heavy blacks may be done with two fires only; and for the light blacks only wringing lefts may do for each heating.

"When blacks are finished they are returned in a trough of cold water by dips one after another, called by the French dyers dipbradur or rinning; they are then twice or thrice becketed at the river. When washed you put them on the cords, only taking care not to press them too much.

"The silk when taken out of the black dye is extremely harsh, which is by no means wonderful, considering the number of acids and corrosives in the composition. It is therefore necessary to soften it in the following manner:

"Dissolve about five pounds of soap in two buckets of water; and while the soap is dissolving, throw in black silk, a handful of aniseed or any other aromatic plant. It should boil till the soap is entirely dissolved. In the mean time a trough should be provided full of cold water, and large enough to dip all the silk at the same time. The soap-water should be strained through linen, the whole mixed well together, and the silk put into it, where it should remain a full quarter of an hour. It is then taken out, wrung on the Peggy and dried as usual. As the quantity of soap can do no harm, too much is better than too little. This softening is very necessary in order to divest the silk of that fulfuling and stiffness so prejudicial in the manufacture of black goods.

"To dye black in the raw, the silk should be called to dye in a cold liquor of fresh galls, which had been previously black in the only used for the boiled silk. The natural yellow of raw silk is preferable for this dye, because the white takes a less beautiful cast.

"Having united the silk and divided it into hanks of the common size, it is dipped with the hands into the gall liquor. When soaked and a little squeezed, it is strung on cords, eight or ten hanks together.

"They are afterwards put into the cold gall-liquor, one above another, letting even the cords sink in the liquor, where they may remain for fix or seven days. They are then taken out and once becketed at the river. As to time, it should remain in the galling according to the strength of the liquor and the quantity of the silk put into it; but however strong it may be, and however small the quantity of silk, it should remain two or three days at least.

"When the silk is washed, it is again strung on the cords and left to drain, after which the cords are put one over the other into the rinsing or black wash, which is of itself sufficient to dye; it will, however, require more or less time according to the strength of the rinsing wash, generally about three or four days. Whilst the silk is thus immersed in the rinsing water, it should be raised with flicks three or four times a day; it is then drained over the liquor, and when drained put on the ground in a proper place, where it is spread and aired, but not dried. This is absolutely necessary to produce the black, else the silk might take a black-grey; this grey would, however, blacken in the air: nevertheless you are thereby enabled to judge
judge how much of the colour it has taken, and how much it may still want. Should the silk be suffered to dry, it must be again wetted before it is re-dipped, which would be an additional and unnecessary trouble.

This operation of washing and drying must be successively continued till the silk is sufficiently black.

The silk in this situation is carried to the river, and twice beetled; after which it is drained on the cords, and then put on the perches to dry without wringing, which would soften it too much; for as this kind of silk is designed for gauzes and black lace, care should be taken to preserve its natural stiffness as much as possible.

To produce black in the raw in the quickest manner, the silk when washed from its galling should be put on the rods and three times returned in the blacking ground; it is then taken out, and put to drain over the vessel containing the black liquor, and then cooled on the rods.

When drained, it is again twice dipped in the black liquor, drained, and each time cooled as at first. When drained it is again walked; and the procedure is then the same as for those which had been dyed in the rinsing. This is not, however, the usual method of dying black in the raw; because it consumes the black liquor too soon, confidering with what avidity the raw silk takes any colour whatever; and besides that a good rinsing is sufficiently strong for dyeing this colour.

The black dye is weakened and becomes exhausted in proportion to the silk it has dyed; it is therefore necessary to strengthen and replenish, from time to time, by an addition of proper drugs, which is called giving the brenet or composition.

This composition is made by putting four or five buckets of water into a copper, and then boiling it with about four pounds of logwood chips. The logwood is then taken out, and four pounds of black buckthorn berries are added with two pounds of pomegranate rind, two pounds of fumac, two pounds of 

Coque de Levant, two pounds of colquimt, two pounds of linseed, and four pounds of cummin.

These drugs are boiled together for about three quarters of an hour; the fire is then put under the black liquor, when a little more than half boiled, and whilst the hot following drugs are added, viz.

2 lb. of redgar | 1 lb. of white arsenic
4 lb. of antimony | 1 lb. of corrosive sublimate
1 lb. of gold litharge | 1 lb. of orpine
1 lb. of silver litharge | 1 lb. of powdered sugar
1 lb. of sal ammoniac | 1 lb. of fenugreek
1 lb. of rock salt | 4 lb. of copperas
1 lb. of crystal mineral

These drugs, when all pounded, are thrown into the black ground, Remembering to file. When the composition is sufficiently boiled, it is strained into a trough and left to settle; the grounds having subsided, the clear part is added to the black ground. The same grounds are again boiled and preferred for some other time.

The composition being added to the black liquor, and sufficiently hot, the fire is taken away. The liquor is then strewed over with the iron filings, and left to settle for two days.

When the black ground has had a certain number of additions, and a quantity of sediment collected at the bottom, part of the grounds should be taken out in order to clear the liquor. Thus frequently replenishing, the foundation is always preferred; so that the liquor is never entirely new, but having been once set for dyeing, it is set for every. These liquors are never liable to putrefaction, owing to the great quantity of nutgalls and martail vitriol in the composition, two of the most powerful antiseptics known.

The most material observation concerning the black dye is, that in general it greatly injures the goods in such a manner that fluids of this colour, though not inferior in other respects, wear out much sooner than those of any other. This defect may be attributed to the vitriolic acid of the copperas, which is but imperfectly taurated with the iron. Iron combined with any, even vegetable, acid, is capable of producing black with vegetable astringents. It is therefore most probable that this inconvenience might presumably be removed, by substituting other combinations of this metal for the copperas, if it were worth while to make the attempt.

All kinds of grey, excepting black grey, are produced upon silk without alumming. The silk being washed from the soap and drained on the peg, a liquor is made of fufic, logwood, archil, and copperas. Fufic gives the ground; archil the red; logwood darkens, and the copperas softens all these colours, turns them grey, and at the same time serves instead of alum in extracting them. As there is an infinite variety of greys without any positive names, and produced by the same methods, it would be endless to enter into a detail that would prolong this treatise to a little purpose.

Suffice it to remark here, that in producing a reddish grey, the archil should predominate; for those more grey, the logwood; and for those still more rusty and rather greenish, fufic.

In general, when obliged to complete the colour with logwood, it should be used rather sparingly, because it is apt in drying to darken too much, differing in this particular from all other colours.

To give an example of the manner of producing these colours, we shall take the nut-grey.

The fufic decoction, archil, and a little logwood, is put into water moderately hot. The silk is then returned, and when the liquor is exhausted it is taken out; and to strengthen the colour the copperas solution is added. Some dyers, for this purpose, add the black wash instead of the copperas; the silk is again returned; and if the colour does not appear sufficiently even, some red spots still remaining, it may be concluded that it requires a little more copperas.

It must also be remembered, that as copperas is the general base of all greys, if deficient in quantity, the colour will be apt to change in drying, and to become rough and uneven.

To try if the colour be sufficiently softened, it should be examined; and if it wets easily, after having been wrung on the peg, it wants copperas; but if on the contrary it soaks with a little difficulty, the colour is enough softened.

On the other hand, too much copperas stiffens the silk considerably, making it harsh, and even depriving it of a great part of its lustre. To remedy this, the
To discharge greys, that is when the shades are too dark and too full, you put some tartar pounded in a mortar and sifted into a bucket or small trough; you then pour over it some boiling water. The clearer of this liquor is afterwards put in a trough, and the silks returned in it; by which operation a part of the colour is immediately discharged.

If the silk does not instantly take an equal colour, a little more tartar must be added as abovementioned.

The silks thus discharged of its superfluous colour is once beetled at the river, and afterwards dipped in hot water, without any other addition. This last operation restores in part what it had lost by the tartar; but to try the colour it should be wrung on the peg.

The tartar always destroying some part of this colour, it should be restored with a fresh liquor made for the purpose, and then fastened with copperas as usual.

If the silk has been aluminated, then the hot water must be omitted after the beetling; the hot water is, however, always of use in removing the hardness occasioned by the tartar.

To discharge iron greys when too dark, they should be sulphured, afterwards beetled at the river, and then again dipped in a fresh liquor similar to the first.

This method of discharging iron greys is preferable to either tartar or lemon juice, the ingredients giving them a ground that does not easily yield even to the boiling with soap, which confecutively spoils the colour; whereas the sulphuring almost entirely whitens the silk by totally destroying the logwood.

For greys in the raw, the silk should be as white as for common colours, except the black grey, for which the natural yellow would be no disadvantage. Having soaked the raw silk, the process is the same for producing these shades as on boiled silk.

Cotton or linen receive a black colour with still of dyeing more difficulty than silk. "The various processes for dyeing cotton or linen black, (says M. de Apligny) for dyeing black, agree in the sole intention of introducing within the pores of the stuff ferruginous particles dissolved in different menstrua, and of precipitating them on the stuff by means of astringent substances furnished with phlogifron capable of colouring iron black. The best method therefore of succeeding, is to choose a solvent capable of dividing the particles so minutely that the caulk may not injure the stuff. Copperas or green vitriol are used in these processes; but the iron it contains is by no means in a state of perfect division, on account of the phlogifron obtinately retained by it, which facilitates its union with the acid without the iron being perfectly dissolved. It is for this reason, doublets, that a solution of green vitriol in water deposits in lime species of ochre; which, according to M. Geoffroy, seems to be an extraneous substance. For the same reason the spirit of nitre, saturated with iron, will dissolve still more, by abandoning the groffer particles of what is held in solution, and of which it retains only the phlogifron.

"This being the case, whenever copperas is used in dyeing of black, the stuffs dyed are generally harsh to the feel and considerably damaged; because the gross particles of the iron being only divided, and not dissolved by the vitriolic acid of the copperas, overspill the pores of the stuff into which they have entered, and by their hardness extending the partition of those pores, force them aunder. M. Hellot very well observes, that cloth dyed black without a blue or root ground requires a greater quantity of copperas, by which the stuff is rendered rotten. But I have also remarked, that when dissolving the rub of iron in vinegar, either for yellow or for the black of painted linens, it is apt to tear in the parts where these colours are applied, particularly if there has been no attention to take off the groffer earth by fcumming the solution. To this

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this earth, therefore the rottenness of black stuff may be attributed; and not, as vulgarly imagined, to the salt of vitriol, nor to any other burning caufe.

"And therefore, in order to render the colour more equal, and the stuffs less damaged, the best method for black is to use a solution of iron perfectly divided. Consequently, as experience daily teaches, those acids which attack the iron too rapidly are the leafe proper to produce a perfect solution of this metal. Weak acids are therefore preferable; which, notwithstanding their slow operation, penetrate entirely, dividing it into immoveable particles. Black compositions also succeed much better in proportion as the black liquor is older, and consequently the solution of the iron more complete. The manufacturers in India are in truth sensible of this consequence, that many of them preserve their black vats for three years. In the states of Genoa, Florence, and Naples, every manufacturing city has a place of reserve, called the Sera-glio, where at the public expense eight or ten vats are continually supported. These vats have been kept from 300 to 400 years, more or less: that is, prepared for the dipping of silk designed for black, and requiring only to be supplied with proper drugs in proportion as they are diminished by use. The ground remaining always the same, forms a kind of leaven, by which the fermentation of the necessary additional drugs is assisted.

"The process at Rouen for dyeing linen and cotton thread black, is first to give it a sky-blue ground, and then to wring and dry. It is afterwards galled, a quarter of a pound of galls for every pound of the substance (as for reds); having remained 24 hours in the gall liquor, it is again wrung and dried.

"About two quarts of the black liquor for every pound is then poured into a trough. The cotton is then dipped and worked with the hand; bound by pound, for about a quarter of an hour, then wrung and aired. This operation is twice repeated, adding each time a fresh quantity of the black liquor carefully scummed. It is again aired, wrung, washed at the river, well drained, and dried.

"When this cotton is to be dyed, about one pound of the rind of the elder-tree for every pound of thread is put into a copper and boiled in a sufficient quantity of water during one hour. About half the liquor that had been used for the galling is then added, with about half the weight of the rind of the alder of fumach. The whole is again boiled for two hours, after which it is strained through a sieve. When it is cold, the cotton is dipped in it on the rods, and worked pound by pound, from time to time airing, and returning it into the liquor; where having remained 24 hours, it is wrung and dried.

"For softening this cotton when too harsh, it is the custom to soak it in the remainder of the well-liquor that had been used for other colours, adding a little of the logwood-liquor. It is then taken out, and instantly plunged into a trough of warm water, into which had been poured about an ounce of the oil of olives for every pound of substance: it is then wrung and dried.

"M. l'Abbé Mazéas has given a process for the dyeing of linen and cotton thread black, by madder after having prepared with the ficcione of the A-
DYEING.

Of compound colours.

Having described in such a particular manner the methods of dyeing the primitive colours, there can be very little difficulty in comprehending the management of those which proceed from a mixture of them. But though an infinite number of different shades may be formed from those already mentioned, we are not to imagine that a good colour will be produced by the mixture of any two at random. Thus, though you mix blue and scarlet together in any way you please in order to produce a purple, the colour will neither be good nor uniform, owing to the opposite action of the acid and alkaline ingredients by which these two primitive colours are fructified. With crimson the coffee is altered; for, as we have already seen, that colour is produced in the greatest perfection where volatile alkali is concerned; and therefore the alkaline ingredients of the blue, which can only tend to heighten that property in the other colour, have no such pernicious tendency. From a mixture of blue and crimson therefore, are produced colurnbine, purple, amaranth, penfy, and other hardy and less beautiful, than one where the colour and dye to unite equally proportion to one another. One of the above-mentioned receipts may serve as a specimen of the methods of dyeing all kinds of mixed colours. There are, however, methods of producing both a more permanent colour than usually is obtained by means of that ingredient. Two cauldrons are to be placed at a little distance from each other; in one of which you put two pieces of cloth of 40 or 50 ells in length, with eight or ten pounds of white soap heaved, and which must be perfectly dissolved. When the mixture is ready to boil, the stuff should be immersed, and suffered to boil a full half hour. In the other cauldron you must prepare another liquor; and when that is quite hot, you put into it a clean linen bag, containing eight or ten pounds of blue vitriol, yellow with virga aurea, and twelve or more of lime, each of them well pulverized and mixed together; it being necessary that the simple should be as accurate as possible. This bag should be moved about in the water, hot, but not boiling, till the vitriol is dissolved. A winch is then to be fixed on in the usual manner; but which ought to be carefully wrapped round with a clean linen cloth very tight and well fewed. One end of the cloth is fixed on the winch, which is then turned swiftly round, that the cloth may pass swiftly from the soap-cauldron into that with the vitriol; and here it is turned more slowly, that it may have time to imbibe the particles of the copper, which by means of the lime were diffused in the liquor by separating and precipitating them from the blue vitriol in which they were contained. The cloth is left in this liquor, which should never boil till the cloth has taken the sea-green colour desired. It is then to be taken out, drained on the winch, and aired by the lifting. It should hang till it is perfectly cold before it be walked at the river. If it touches wood it will be spotted; for which reason, the winch, and every thing of wood over which it must pass, ought to be well covered with linen.

On examining these processes by the principles of chemistry, it appears to be no other than impregnating the cloth with a solution of copper in fixed alkali. It is undoubtedly a mistake to say, that it is done by verdigris; for no verdigris can be formed from blue vitriol, lime, and soap. All that we can say of it, is, that it is cloth impregnated with a combination of copper with fixed alkali, which being naturally extremely ready to unite with water, and having very little attraction for the cloth, the latter may be supposed to be painted rather than dyed with it. A much better method, therefore, seems to be that recommended by M. Hellot, that is, first dyeing the stuff a very light blue, and then giving the necessary yellow with virga aurea. These receipts may serve as specimens of the methods of dyeing all kinds of mixed colours. There is, however, methods of producing both a blue and green from indigo itself, by dissolving it in acids; and
DYEING.

The colours so produced are called Saxon blues and greens. Being perishable colours, they are now seldom used; though Mr Wolfe some time ago published a receipt in the Philosophical Transactions for preparing them after an improved method. This method, for the blue, was to dissolve indigo in concentrated oil of vitriol by digesting them in the heat of boiling water instead of sand, which had formerly been used, and was apt to spoil the colour. After the solution of the indigo, the liquor may be weakened at pleasure; and any piece of cloth dipped in it will imbibe a dye deeper or lighter according to the quantity of colour it contains. This colour is very beautiful, but apt to prove unsteady.

For the Saxon green it is necessary to have a yellow from indigo also, which is obtained by dissolving it in spirit of nitre. Mr Wolfe recommends an ounce and a half of powdered indigo to be mixed with two ounces of spirit of nitre diluted with four times its quantity of water. The mixture is then to stand for a week, and at the yellow loofefrife, which is to be digested in a sand heat for an hour or more; after which four ounces more of water are to be added. The solution, when filtered, will be of a fine yellow colour. Strong spirit of nitre, when mixed undiluted with indigo, is apt to let fire to it; for which reason the water is added. Even in its diluted state, it will froth and run over if the digestion be performed within 24 hours after the mixture; and on this account it is allowed to remain a week in the cold. One part of the solution of indigo in the acid of nitre, mixed with four or five parts of water, will dye flax or cloth of the palest yellow colour, or of any shade to the deepest, by letting them boil a longer or shorter time, adding water as the liquid evaporates. The addition of alum makes the colour more lasting. None of the colour separates in the operation but what is imbied by the cloth, and therefore this liquid goes very far in dyeing. That part of the indigo which remains undissolved in the vitirole acid, when collected by filtration and dissolved in spirit of nitre, will dye flax and wool of all shades of brown inclining to yellow.

On the process for dyeing Saxon blue M. de Apligny observes, that there is no real solution of the indigo in the acid of vitriol, but that it is only divided into very fine particles and suspended in the liquor; neither can any alteration be made in it by an alteration in the process. Nor does this make any exception to the general rule in chemistry, that acids dissolve and redinate the blue colouring matter of vegetables; it not being their nature to act upon fuscule such as indigo, but upon vegetable juices, the colour of which depends on the salts and essential oil of the plant. For the truth of his assertion he appeals to the appearance of the liquor prepared for dyeing Saxon blue.

From the vast profusion of colours which nature exhibits in the flowers which grow every where around us, it is natural to think that the materials for dyeing might be had in the greatest plenty without any necessity of having recourse to foreign countries. But this is far from being the case; for scarce one of our blue or red flowers can be made to communicate any durable colour to cloth; while, on the other hand, almost all the yellow ones can be made to do so. Numberless experiments have been made to determine the plants which might be really useful to dyers; and most that have yet been found fit for their purpose in Britain are comprehended in the following list.

**Yellows.**
- Bark of buckthorn, *Rhamnus catharticus.*
- Berry-bearing elder, *Sambucus frangula.*
- Berry, *Berberis vulgaris.*
- Plum-tree, *Prunus domestica.*
- Plum, *Pyrus malus.*
- Carpinus betulus.
- Thalictrum flavum.
- Urtica dioica.
- Serratula tinctoria.
- Hieracium umbellatum.
- Bidens tripartita.
- Myrica gale.
- Stachys byzantina.
- Polygonum perfoliata.
- Linum vulgare.
- Scabiosa acaulis.
- Anthyllis vulneraria.
- Lichen parietinus.

**Blacks.**
- Flowers of St John's wort, *Hypericum perforatum.*
- Red.
- Roots of ladies bedstraw, *Galium verum.*
- Herb woodroof, *Althaea tinctoria.*
- Forrel, *Rumex acetosa.*
- Tormentil, *Polygono rum cretica.*
- Comarum palustre.
- Origanum vulgare.

**Blues.**
- Bark of the ash, *Fraxinus excelsior.*
- Flowers of larkspur, *Delphinium consolida.*
- Flowers of blue anemone, *Campanula rotundifolia.*
- Empetrum nigrum.

**Greens.**
- Herb of ragwort, *Senecio Jacobaea.*
- Cow-weed, *Chernophyllum vulgare.*
- Panicle of brome-grasses, *Bromus secalinus.*
- Common reed, *Arundo phragmites.*

**Blacks.**
- Bark of oak, *Quercus robur.*

As it is often necessary to give another colour to stuffs which have been already dyed, it is plain, that it discharge colours as how to make the cloth imbibe them. Concerning this, it is only necessary to observe, that alkaline fairs are in general the best, and, where the colours are well dyed, the only means of discharging them. If a piece of cloth is dyed with logwood, and the colour is stuck upon it with alum, that colour will be nearly discharged by oil of vitriol, or any other strong acid; but if solution of tin has been employed in striking the colour, acids have then no effect, and alkalies only can be employed. Neither will they discharge the colour totally, but the stuff must be bleached for some time to get out the remainder. If alkaline salts cannot be employed with safety to the stuff, it is then impossible to dye it any other colour than black; unless it be dyed

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Materials for dyeing leaves numerous that might be disponibles.
DYING.

A compound colour, of which the original one is a component part.

Concerning the weight that colours give to silk (in which it is most taken notice of, being told by weight, and a commodity of great price); it is observed, that one pound of raw silk loseth four ounces by washing out the gums and the natural fords; that the same soored silk may be raised to above thirty ounces from the remaining twelve, if it be dyed black with some materials. Of all the materials used in dyeing, especially of black, nothing increaseth weight so much as gall, by which black silks are restored to as much weight as they lost by washing out their gum; nor is it counted extraordinary, that blacks should gain about four or six ounces in the dyeing upon each pound. Next to the galls, old fuscic increaseth the weight about 15, in 72; madder, one ounce; weld, half an ounce; the blue vats in deep blues of the fifth stall gives no considerable weight; neither do logwood, cochineal, nor even copperas, where galls are not used.

DYING.

DYING of Hats. See Hats.

DYING of leather. See Leather.

DYING, or Staining, of paper, wood, bone, marble, &c. See Bone, Marble, Paper, Wood, &c.

DYNASTY, among ancient historians, signifies a race or succession of kings of the same line or family. Such were the dynasties of Egypt. The word is formed from the Greek θυγατρική κυβέρνησις, to be powerful, or kind.

The Egyptians reckon 30 dynasties within the space of 36,525 years; but the generality of chronologers look upon them as fabulous. And it is very certain, that these dynasties are not continually successive, but collateral.

DYRRACHIUM (anc. geog.), a town on the coast of Illyricum, before called Epidamnum, or Epidamnus, an inauspicious name, changed by the Romans to Durazzo; a name taken from the peninsula on which it stood. Originally built by the Corecyrians. A Roman colony (Philly). A town famous in story; its port answered to that of Brundusium, and the passage between both was very ready and expeditious. It was also a very famous mart for the people living on the Adriatic; and the free admission of strangers contributed much to its increase: A contrast to the conduct of the Apollonians; who in imitation of the Spartans, discouraged strangers from settling among them.

DYS, in mythology, inferior goddesses among the Saxons, being the messengers of the great Woden, whose province it was to convey the souls of such as died in battle to his abode, called Valhall, i.e. the hall of slaughter; where they were to drink with him and their other gods, and, or a kind of malt liquor, in the skulls of their enemies. The Dyse conveyed those who died a natural death to Hel, the goddess of hell, where they were tormented with hunger, thirst, and every kind of evil.

DYSERY, among physicians, denotes an ill habit or state of the humours, as in the fever, jaundice, &c.

DYSENTERY, in medicine, a diarrhoea or flux, wherein the fowls are mixed with blood, and the bowels miserably tormented with gripes. See Medicine-Index.

DYSENTERIC FEVER. Ibid.

DYSERT, a parliament town of Scotland, in the county of Fife, situated on the northern shore of the firth or Forth, about 11 miles north of Edinburgh.

DYSOREXY, among physicians, denotes a want of appetite, proceeding from a weakly stomatch.

DYSPEPSY, a difficulty of digestion.

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DYSPNOEA, a difficulty of breathing, usually called Asthma.

DYSPNOUR, in medicine, a difficulty of making urine, attended with a sensation of heat and pain. See Medicine-Index.

DYTISCUS, WATER-BEETLE, in zoology, a genus of insects of the order of the coleoptera; the antenna, of which are slender and fetaeous, and the hind feet are hairy and formed for swimming. There are 23 species, distinguished by their antennæ, the colour of the elytra, &c.

The larvae of the dytiscus are often met with in water. They are oblong, and have five scaly feet. Their body consists of eleven segments. The head is large, with four filiform antennæ and a strong pair of jaws. The last segments of their body have rows of hairs on the sides; and the abdomen is terminated by two spines charged with the hair, forming a kind of plumes. These larvae are frequently of a greenish variegated brown: they are lively, active, and extremely voracious; they devour and feed upon other water-insects, and often tear and destroy each other. The perfect insect is little inferior to its larvae variegatibus, but it can only exercize its cruelty on the larvae; the perfect insect, like himself, being sheltered by the kind of scaly cuirass with which they are armed. This creature must be touched cautiously; for besides its power of giving a severe grip with its jaws, it has moreover, under the thorax, another weapon, a long sharp spine, which it will drive into one's fingers by the effort it makes to move backwards. The eggs of the dytiscus are rather large, and are by them inclosed in a kind of silky dusty cocoon, of a strong and thick texture, in form round, and terminated by a long appendix or slender tail, of the same substance. These cocoons are often found in the water, and from them are brought fourth the eggs and larvae of the dytiscus. The strength of these cocoons probably serves the insect to defend their eggs from the voracious insects of several other aquatic insects; and even from that of their fellow-dytiscus, who would not spare them. Many species of the perfect insect are common in stagnant waters, which they quit in the evening to fly about. They swim with incredible agility, making use of their hinder-legs after the fashion of oars. The elytra of the females are in general narrowed, and those of the male plain: when they first arrive at their perfect state, their elytra are almost transparent and in many species of a beautiful dun colour, mingled with shades of greenish brown. The best method of catching
DYVOUR, in Scots law; otherwise Baré-man: A person who, being involved in debt, and unable to pay the same, for avoiding imprisonment and other pains, makes confession of his effects in favour of his creditors; and does his devoir and duty to them, proclaiming himself bare man and indigent, and becoming debt-bound to them of all that he has. The word is used in the same sense as Bankrupt: see that article; and Law No. clxxiii, 11, 12, clxxiv. 10, 11, 12, &c.

EACHARD (Lawrence), an eminent English historian of the 18th century, nearly related to Dr John Eachard. He was the son of a clergyman, who, by the death of his elder brother, became master of a good estate in Suffolk. He was educated in the university of Cambridge, entered into holy orders, and was presented to the living of Welton and Elkington in Lincolnshire, where he spent above 20 years of his life, and distinguished himself by his writings, especially his History of England, which was attacked by Dr Edmund Calamy and by Mr John Oldmixon. His "General Ecclesiastical History from the Nativity of Christ to the first Establishment of Christianity by human Laws under the emperor Constantine the Great," has passed through several editions. He was innsailed archdeacon of Stowe and prebend of Lincoln in 1712. He died in 1730.

EADMUS, an esteemed historian, was an Englishman; but his parents, and the particular time and place of his nativity, are not known. He received a learned education, and very early discovered a taste for history, by recording every remarkable event that came to his knowledge. Being a monk in the cathedral of Canterbury, he had the happiness to become the bosom-friend and inseparable companion of two archbishops of that see, St Anselm and his successor Ralph. To the former of these he was appointed spiritual director by the Pope; and that prelate would do nothing without his permission. In the year 1120, he was sent for by king Alexander I. of Scotland, to be raised to the primacy of that kingdom; and having obtained leave of king Henry and the archbishop of Canterbury, he departed for Scotland, where he was kindly received by the king; and on the third day after his arrival, he was elected bishop of St Andrew's with much unanimity. But on the day after his election, an unhappy dispute arose between the king and him, in a private conference about his consecration. Eadmerus having been a confiant companion of the late and of the present archbishops of Canterbury, was a violent stickler for the prerogatives of that see. He therefore told the king, that he was determined to be consecrated by none but the archbishop of Canterbury, who he believed to be the prince of all Britain. Alexander, who was a fierce prince,
Prince, and supported the independency of his crown and kingdom with great spirit, was so much offended, that he broke off the conference in a violent passion, declaring, that the see of Canterbury had no pre-eminence over that of St Andrew's. This breach between the king and the bishop-elect became daily wider, till at length Eadmerus, desiring of recovering the royal favour, sent his pastoral ring to the king, and laid his pastoral staff on the high altar, from whence he had taken it, and abandoning his bishopric returned to England. He was kindly received by the archbishop and clergy of Canterbury, though they disapproved of his actions, and thought him too haughty in forsaking the honourable station to which he had been called. Nor was it long before Eadmerus became sensible of his error, and desirous of correcting it. With this view he wrote a long submitted letter to the king of Scotland, intreating his leave to return to his bishopric, promising compliance with his royal pleasure in every thing respecting his consecration, which was accompanied by an epistle to the same purpose from the archbishop. These letters, however, which were written A. D. 1122, did not produce the desired effect. But Eadmerus is most worthy of the grateful remembrance of posterity for his historical works, particularly for his excellent history of the affairs of England in his own time, from A. D. 1066 to A. D. 1122; in which he hath inserted many original papers, and preferred many important facts, that are no where else to be found. This work hath been highly commended, both by ancient and modern writers, for its authenticity, as well as for regularity of composition and purity of style. It is indeed more free from legendary tales than any other work of this period; and it is impossible to peruse it with attention, without conceiving a favourable opinion of the learning, good sense, sincerity, and candour of its author.

EAGLE, in heraldry, is accounted one of the most noble bearings in armoury; and, according to the learned in this science, ought to be given to none but such as greatly excelled in the virtues of generosity and courage, or for having done singular services to their sovereigns; in which cases they may be allowed a whole eagle, or an eagle naiant, or only the head or other parts thereof, as may be most agreeable to their exploits.

The eagle has been borne, by way of ensign or standard, by several nations. The first who seem to have affirmed the eagle are the Persians; according to the testimony of Xenophon. Afterwards, it was taken by the Romans; who, after a great variety of standards, at length fixed on the eagle, in the second year of the confulate of C. Marius: till that time, they used indifferent wolves, leopards, and eagles, according to the humour of the commander.

The Roman eagles, it must be observed, were not painted on a cloth or flag; but were figures in relief, of silver or gold, borne on the tops of pikes; the wings being displayed, and frequently a thunder-bolt in their talons. Under the eagle on the pike, were piled bucklers, and sometimes crowns. This much we learn from the medals.

Constantine is said to have first introduced the eagle with two heads, to intimate, that though the empire seemed divided, it was yet only one body. Others say, that it was Charlemagne who esteemed the eagle as the Roman ensign, and added to it a second head; but that opinion is destroyed, by an eagle with two heads, noted by Lippus, on the Antonine column; as also by the eagle's only having one head on the seal of the golden bull of the emperor Charles IV. The conjecture, therefore, of F. Meneistrier appears more probable, who maintains, that as the emperors of the earth, when there were two on the throne at the same time, struck their coins with the impression of a crofs, with a double traverfel, which each of them held in one hand, as being the symbol of the Christians; the like they did with the eagle in their enigus; and instead of doubling their eagles, they joined them together, and represented them with two heads. In which they were followed by the emperors of the West.

F. Paprobeche wishes that this conjecture of Meneistrier were confirmed by ancient coins; without which, he rather inclines to think the use of the eagle with two heads to be merely arbitrary; though he grants it probable, that it was first introduced on occasion of two emperors in the same throne.

The eagle on medals, according to M. Spanheim, is a symbol of divinity and providence; and according to all other antiquities, of empire. The princes on whose medals it is most actually found, are the Protomachus and the Seleucides of Syria. An eagle with the word consecratio, expresses the apotheosis of an emperor.

Eagles, a name found very frequently in the ancient histories of Ireland, and used to express a fort of base money that was current in that kingdom in the first years of the reign of Edward I. that is, about the year 1272. There were, besides the eagles, lions, rofades, and many other coins of the same fort, named according to the figures they were impressed with.

The current coin of the kingdom was at that time a composition of copper and silver, in a determined proportion, but these were far more worth than the base money that was current in that kingdom in the year 1325, when Uladinus V. made it half so much as the others. They were imported out of France and other foreign countries. When this prince had been a few years established on the throne, he set up mints in Ireland for the coining sufficient quantities of good money, and then decreed the use of these eagles, and other the like kinds of base coins, and made it death, with confiscation of effects, to import any more of them into the kingdom.

Eagle, in astronomy, is a constellation of the northern hemisphere, having its right wing contiguous to the equinoctial. See Aquila.

There are also three several stars, particularly denominated among the Arab astronomers, namr, i. e. "eagle." The first, namr soba, the "eagle of canopus," called also starihe janem, the star of Arabia Felix, over which it is supposed to preside; the second, namr althair, the "flying eagle;" and the third, namr alwakes, the "red eagle."

White Eagle, a polish ord of knighthood, instituted in 1325 by Uladinus V. on marrying his son F 2 Casimir
EAR

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37. Hen. VIII. cap. 6. § 4. In the index to the Statutes at Large, it is said, that this offence may be punished as felony, by 22 and 23 Car. II. cap. 1. § 7. commonly called Coventry's act; but ear is not mentioned in that statute.


EAR, in music, denotes a kind of internal sense, whereby we perceive and judge of harmony and musical sounds. See Music.

In music we seem universally to acknowledge something like a distinct sense from the external one of hearing; and call it a good ear. And the like distinction we should probably acknowledge in other affairs, had we got distinct names to denote these powers of perception by. Thus a greater capacity of perceiving the beauties of painting, architecture, &c. is called a fine taste.

EAR is also used to signify a long cluster of flowers, or seeds, produced by certain plants; usually called by botanists *fica*. The flowers and seeds of wheat, rye, barley, &c. grow in ears. The same holds of the flowers of lavender, &c. We say the stem of the ear, i.e. its tube or straw; the knot of the ear; the lobes or cells wherein the grains are enclosed; the head of the ear, &c.

EAR-Aub. See (the Index subjoined to) Medicine.

EAR-Pick, an instrument of ivory, silver, or other metal, somewhat in the form of a probe, for cleansing the ear. The Chinese have a variety of these instruments, with which they are mighty fond of tickling their ears; but this practice, Sir Hans Sloane observes, must be very prejudicial to so delicate an organ, by bringing too great a flow of humours on it.

EAR-Ring. See Pendent.


EARWIG, in zoology. See Forficula.

EARING, in the sea-language, is that part of the flowers and seeds of wheat, rye, barley, &c. which is called the ear. We say the stem of the ear, i.e. its tube or straw; the knot of the ear; the lobes or cells wherein the grains are enclosed; the head of the ear, &c.

EARL, a British title of nobility, next below a marquis, and above a viscount.

The title is so ancient, that its original cannot be clearly traced out. This much, however, seems tolerably certain, that among the Saxons they were called *aldorman*, quasi elder men, signifying the name with the hand of the Romans; and also *seigneur*, because they had each of them the civil government of a feudal division or shire. On the irritation of the Danes they changed their names to *corTell*, which, according to Camden, signified the name in their language. In Latin they are called comites (a title first used in the empire), from being the king's attendants; *a societate nomen ssumperunt, regis eintales libellant*. After the Norman conquest they were for some time called *counts*, or *comes*, from the French; but they did not long retain that name themselves, though their shires are from hence called *counties* to this day. It is now become a mere title: they have nothing to do with the government of the county; which is now entirely
Earth.

**Earl.** In writs, commissions, and other formal instruments, the king, when he mentions any peer of the degree of an earl, usually styles him "truly and well-beloved earl." An appellation as ancient as the reign of Henry IV.; who being either by his wife, his mother, or his sisters, actually related or allied to every earl in the kingdom, artfully and confidently acknowledged that connection in all his letters and other public acts; whence the usage has descended to his successors, though the reason has long ago failed.

An earl is created by cinerum of sword, mantle of state put upon him by the king himself, a cap and a coronet put upon his head, and a charter in his hand.

**Earl-Marshal.** See Marshal.

**Earnest (Arreia).** Money advanced to bind the parties to the performance of a verbal bargain. By the civil law, he who recedes from his bargain loses his earnest, and if the person who received the earnest give back, he is to return the earnest double. But with us, the person who gave it, is in strictness obliged to abide by his bargain; and in case he decline it, is not discharged upon forfeiting his earnest, but may be found liable for the whole money advanced.

**Earth.** Among ancient philosophers, one of the four elements of which the whole system of nature was thought to be composed. See Element.

Earths, in chemistry, are defined by Cronstedt to be such substances as are not ductile, mostly indissoluble in water or oil, and that preserve their constitution in a strong heat. Mr Bergman remarks that they are infipid, and not soluble in 1000 times their weight of boiling water; though, by augmenting the heat, as in Papin's digester, perhaps all the kinds we are yet acquainted with may be found capable of solution, especially when precipitated from some other menstruum; their surface being then greatly augmented. In the chain of nature they proceed by an insensible gradation towards the salts, so that they cannot be separated but by artificial limits. A moderate heat does not change their form, nor are they disintegrated by a more violent one. Dr Black defines them to be such bodies as are not soluble in water, not inflammable; and their specific gravity not more than four times the weight of water. They are distinguished from the salts by their insolubility; from the inflammables, by their want of inflammability; and from the metals, by their deficiency in weight. Some objections have been made to this definition, as not being strictly applicable to those earths which are known to be soluble in water; but this objection may be accounted of little weight, when we consider the extreme disparity between the solubility of the earths and salts, a few grains of the earths saturating some pounds of water; so that if they have any solubility, they must be allowed to possess but a very small share of it.

Another property, which is not usually taken into the definition, makes nevertheless a remarkable part of the character of earthy bodies, viz. their great fixedness in the fire. All the other classes of bodies show themselves volatile in more or less violent degrees of heat. All the salts can be made to evaporate; all the inflammables are volatile; all the metals, gold not excepted, have been converted into vapour; but the earths, as far as we know, have never been volatilized, excepting only two, the diamond and albite. Some phenomena attending the volatilization of the diamond give reason to suspect that it is not a pure earthly substance. There is an appearance of inflammation; and seems to be a compound, having an earthly matter for its basis, and deriving its volatility from other matters. In general, therefore, the earths have been found fixed in any degree of heat which we have had experience; though there is no doubt a possibility, that heat might be raised to such an intensity as to volatilize the most fixed body in nature; but till the means of doing so shall be found out, the earths may be considered as absolutely fixed.

The earths called *primitiveus simplicis*, because they cannot be decomposed by any method hitherto known, were by Cronstedt supposed to be nine; but later chemists have reduced them to five. Some reduce the number still farther; but Mr Bergman informs us that these "refit their opinions upon fanciful metamorphoses unsupported by faithful experiments. As experiments teach us that there are five primitive earths, it is evident that the species arising from their mixture cannot exceed 24, viz. nine double, consisting of two earths; six triple, three quadruple, and the five primitive earths. Even all these different mixtures have not been found, though they probably do exist in nature. The natural compositions of acids with the earths, forming substances not soluble in 1000 times their weight of boiling water, and which may be called *saline earths,* are undoubtedly chemical combinations. The five primitive earths are, terra ponderofa; caix or calcareous earth, capable of being reduced into quicklime; magnesia; argilla or argillaceous earth; and siliceous earths.

But though we must consider these as the most pure of all the earthly bodies, they are never found native in a state of absolute purity; nor indeed can they be made perfectly pure even by artificial means. Water and aerial acid unite readily with the four first; and when expelled by fire, a little of the matter of heat is added, until driven out by a more powerful attraction. But in this state they possess a degree of purity not to be attained by any other known method. Therefore it is necessary to examine them when sufficiently burnt, in order to distinguish better what properties depend upon adhering heterogeneous matters."

Our author at first added the earth of gems to the five classes already mentioned; but he found afterwards that all kinds of gems are compounded of some of the five kinds already mentioned, particularly of the argillaceous kind, in such a manner that they may be said almost entirely to belong to this class. Still, however, the earth of diamonds seems to possess properties essentially distinct from the five already mentioned, and therefore may not unjustly be reckoned a sixth class, though its characters have as yet been but very imperfectly examined.

1. *Terra Ponderofa*. This was discovered in Sweden about the year 1774, and is found in several different forms.

1. Combined with aerial acid, called by Dr Withering *terra ponderofa aerata*. This substance has been met
Earth.
met with in England; and an account of it, with Dr Withering's analysis, is given under the article Chemistry.

2. The spar-like gypsum, marmor metallicum, lapis bononienisis, phosphorus natuits, baro-felenite, &c. is of very considerable specific gravity, approaching to that of tin or iron; on which account it has been supposed to contain something metallic. But no experiments hitherto made have evinced the existence of any metal in it, excepting a few traces of iron, which are to be met with in all the gypsum. It is met with of two kinds, femitransparent and opaque; the latter being either of a white or reddish colour.

The specific gravity is about 3,500, water being accounted 1000. It contains about 84 parts of pondeorous earth, 19 of the most concentrated vitriolic acid, and three of water. The method of preparing the phosphorus from this sub stance is mentioned under the article Chemistry; but Cronstedt observes, that the phosphorescent quality of these stones is different from that of the sparry flours and limestones, which is only produced by their being slowly heated, and seems to arise from a phlogiston which is destroyed by a glowing heat. M. Scheffer, in the Stockholm Memoirs for 1753, relates some experiments on a stone of this kind from China, which show that it is exactly the same with the pseudeph of that country, an ingredient in their porcelain manufactories. This stone does not burn into plaster as gypsum does, and is infusible by itself. It frequently contains calcareous earth, and sometimes is met with in the ores of metals, and it likewise forms the basis of some Petrifications. Sometimes it contains one or two parts of iron in the hundred.

3. The marmor metallicum drusicum, or ponde ros drusen spar, is found in the lead-mines at Allomoor in Cumberland, regularly crystallized in the form of alum, solid, and semitransparent. M. Magellan says that he was shewed some fine specimens of this mineral by a Mr Thomson, who informed him that it seems to affect the peculiarity of having its crystals laminated, as radiating from a centre; but that this radiation seldom amounts to a whole circle. The corners of these flat crystals are truncated like those of alum, and thicker on one side than the other of the parallelogram, in such a manner as to fit one another in the kind of arched vault which they form together, and have some small ones adhering to their sides like drusen spars, having internal angles, as the nature of the French, or the crustiform crystallizations. The specific gravity of these crystals were found by Mr Nicholson, with an instrument of his own invention, to be to water as 44,745 to 10,000. This species of crystals is found in Auvergne in France, and has been described by Mr Bayen, who suppos'd its basis to be calcareous. It was extremely refractory, and the surface of its crystals covered with ferruginous ochre. A variety of this is found jagged like cocks combs. This is met with in clifts and fissures, accreted on the surfaces of balls of the same substance. In Derbyshire this substance is called auk or alk. M. Magellan was shewed some specimens of it by Mr Whitehurst, which had not only convex but flat surfaces. Thefe of the upper aggregated parts were rather like the edges of very thin flattish leaves put together, than like cocks combs. Varieties of it are also found of white and reddish colours. It is likewise met with of a fibrous texture in the form of zeolite or asbestos in filaments. M. Monnet is of opinion that thefe spars sometimes contain phlogiston, having observed that they become a liver of sulphur in a strong heat; but Mr Woulfe is of opinion that this gentleman was deceived by charcoal falling into his crucible.

4. The lapis hepaticus, or leberfein of the Germans and Swedes. Some specimens of this stone constantly smell like liver of sulphur, but others only when rubbed. It does not effervesc with acids, and according to M. Magellan is a medium between the gypsum and vitelline carbonates of lead, with which it has generally been confounded; but it will not yield any lime, though the latter are more fit for the purpose than any other. Mr Kirwan informs us that this stone is generally compact, but not hard enough to strike fire; its texture is either equable or laminar, scaly or sparry; and it takes a polisht like alabaster, does not effervesce with acids, and when calcined is partially reduced to a kind of plaster of Paris. According to the analysis of this stone given us by Professor Bergman, 100 parts of it contain 33 of baro-felenite, 38 of limes, 22 of alum, 26 of gypsum, and five of mineral oil. Cronstedt denies that these stones contain any volatile alkali, though his assertion is contradicted by Walle rius, who affirms, that a volatile alkali certainly exists in them, and may be discovered by a chemical analysis.

The method which nature takes to combine the ingredients of the lapis hepaticus (say Cronstedt), may be perhaps the same as when a limetone is laid in an heap of munde while it is roasting; because there the sulphur unites itself with the limetone, whereby the latter acquires the smell of liver of sulphur, instead of which the vitriolic acid alone enters the composition of gypsum. How the sulphur combines itself may likewise be observed in the flate-balls or kernels from the Andrarum alum mines to be afterwards mentioned, where it sometimes combines with a martial earth in which this flate abounds, and with it forms pyrites within the very flate-balls. The feid or fwine stones, as well as the liver-stones, are, with regard to the structure of their parts, subject to the same varieties with the other kinds of limetones. This kind of stone is found, 1. Scaly, of which there are two varieties; one having coarse scales, the other of a whitish yellow colour. 2. With fine glittering scales. This is met with of a black colour at Andrarum in Sweden, in the alum flate abovementioned. Bergman says that this kind consists of a ponderous earth combined with a vitriolic acid, mixed with a rock oil, and with the calcareous, argillaceous, and siliceous earths. He adds, that by a chemical analysis one of these kernels gave 29 parts of caufty ponderous earth, 33 of siliceous, almost 5 of the argillaceous, and 3-7 of lime, besides the water and vitriolic acid which entered its composition.

II. Calcareous Earths, when freed from impurities as far as possible, have the following properties. 1. They become friable when burnt in the fire. 2. They more readily fall into powder by being thrown into water, or having it thrown upon them after calcination. 3. They cannot be melted by themselves into glass in coals.
Earth. 4. They augment the causticity of alkaline salts by being mixed with them after burning.

5. They exhibit different phenomena in combination with the different acids. With the vitriolic they precipitate in the form of a yspeous earth capable of shooting, by proper management, into selenic crystals. With marine acid they form a deliquescient mafs called fixed sal ammoniac, and which forms a kind of phosphorus. With nitrous acid they combine into a glutinous deliquescent mafs, from which the acid may be partly driven off by fire; in which operation part of the earth itself is volatilized, and which, in a certain state of calcination, produces Baldwin's phosphorus. With the floor acid they regenerate the fpar from which this acid was procured. With phosphoric acid they are said to regenerate the earth of bones; though the experiments by which this is said to be proved are, as we have often had occasion to observe, by no means conclusive. With the acid of vinegar they crystalize into neutral salts, which do not deliquesc in the air. 6. With borax they readily melt into a kind of glafs which takes impressions in a degree of heat below ignition.

7. With the microscopic acid they likewise melt into glafs with effervescence; a circumstance likewise observable when borax is made use of; and both these glasses are quite colourless and transparent while hot, but become opaque as soon as they cool; but if the bead is thrown whilst hot into melted tallow, or even in water, whilst hot, the liquor, it preserves its transparency.

8. With fluorspar they melt more readily than with any other into a kind of flag, by which crucibles are corroded. This, however, according to M. Magellan, is entirely to be attributed to the solvents.

In certain cases they are likewise found capable of reducing some metallic calces, as those of lead and bismuth; sometimes also those of iron and copper are affected, though in a less degree. But on this Mr Kirwan remarks, that such reductions take place only when the earth is combined with aerial acid: and that though calces of lead are in some measure reduced by chalk, they are not in the least affected by lime; which evidently proves that they receive phlogiston from fixed air, which is a compound of phlogiston and dephlogisticated air. In this last instance, as well as in some others, they resemble alkaline calces: whence they frequently take the title of alkaline earths. Mr Bergman observes, that as calcareous earth united to the aerial acid is found native, very little trouble is necessary to procure it in a state of purity. For this purpose nothing more is requisite than to boil selected pieces of chalk repeatedly in pure water, which dissolves any calcined earth or magnesia falsia that may be contained in it; after which operation it has no heterogeneous matter but what mechanically adheres to it, the quantity of which is generally extremely small; and if we likewise desire to have it absolutely free of this, we must dissolve it in vinegar, precipitate it with mild volatile alkali, and dry it after carefully washing the precipitate. The specific gravity of the precipitate thus carefully washed and dried is about 2.720.

An hundred parts of it contain about 34 of aerial acid, 11 of water, and 54 of pure earth. Acids unite with it with effervescence, and the mixture produces heat. When burnt it loses 48% of its weight; and in this state dissolves in 700 times its weight of water, producing heat at the same time. If acids are poured upon it when in a calcined state, a great degree of heat is produced; infomuch that unless part of it be abstracted by previously mixing the earth with water, the mixture will be made to boil. The pouring of water upon calcined earth of this kind likewise expels the atmospheric air from its pores. In this case, if nitrous or muriatic acid be added, no effervescence will ensue; the solution will proceed slowly, but the faturcation becomes at length as perfect as if the earth had not been calcined. By this burnt earth the acid is expelled from sal ammoniac, sulphur is dissolved, and other remarkable effects performed, of which an account is given under the articles CHMISTRY, DYEING, CEMENT, MORTAR, &c.

The calcareous earth, according to Cronstadt, is common to all the three kingdoms of nature: existing in the shells and bones of animals, the ashes of vegetables; and consequently, says he, it must have existed before any living or vegetable substance, and is no doubt distributed throughout the earth in a quantity proportioned to its general use.

The forms in which calcareous earth is ever met with are the shells of animals, chalk, limestone and marble; for an account of which see these different articles. Its ufe as a manure, and in building, are detailed under the articles CEMENT and AGRICULTURE. Mellis Sage, Hume de L'Ile, &c. have suppofed the exiftence of a kind of earth called abforbent, different from the calcareous; but M. Monnet has shown this to be truly calcareous.

III. Magnesia, called also terrea muriatica, or magnesia alba. The nature and properties of this earth are defcribed under the article MAGNEsIA. It is found, 1. Combined with the vitriolic acid in the form of a bitter salt, called Epom or Sedlitz salt. This is found in great plenty in the liquor which remains after the crystallization of sea-falt.

2. With the marine acid; in which case it forms a salt, likewise crystallized: and being of a very hot burning taste, and emitting vapours of spirit of falt by distillation. This is known by the name of magnesia fulicina, and is likewise found in plenty in the liquor above-mentioned.

3. It is contained also in fresh waters, where it is dissolved by the acidic acid.

4. Combined with the siliceous earth. This is commonly unctuous to the touch, and of different degrees of hardness, incapable of being diffufed in water, and growing hard and very refractory in the fire. It is met with in various parts of the world, particularly in the east, and is the substance of which the large Turkish tobacco-pipes are made. It is also called French chalk, and is met with in England about the Land's End of Cornwall, of a yellow colour, or red and white like Caffile soap. It consists, according to Mr Wiegleb, of equal parts of magnesia and siliceous earth. A mixture of this with calcareous earth and iron is found near Thionville in the French part of Luxembourg. It is of a blue colour, and contains the greatest proportion of calcareous earth, with some clay and petrifed matters. Another of an olive colour is found in the same place; but has no argillaceous earth in it, though they both
both look like clay, and the last is used in pottery.

A mixture of this earth with clay, tale, and iron, is found in Scythia. It is of a greenish yellow, is of a loose form and grey in feel. According to Mr. Margraff it contains one-third of magnesia.

5. In slateites or soap-rock. See Slateites.


IV. Argillaceous Earths. See Clay.


Earth, in astronomy and geography, one of the primary planets; being this terraqueous globe which we inhabit.

The cosmogony, or knowledge of the original formation of the earth, the materials of which it was composed, and by what means they were disposed in the order in which we see them at present, is a subject which, though perhaps above the reach of human sagacity, has exercised the wit of philosophers in all ages. To reconcile the opinions of all the eminent philosophers of antiquity upon this subject would be very tedious: it may therefore suffice to observe, that, ever since the subject began to be canvassed, the opinions of those who have treated it may be divided into two classes.

1. Those who believed the earth and whole visible system of nature to be the Deity himself, or connected with him in the same manner that a human body is with its soul.

2. Those who believed the materials of it to have been eternal, but distinct from the Deity, and put into the present order by some power either inherent in themselves or belonging to the Deity. Of the former opinion were Zenophanes the founder of the eleatic sect, Strato of Lampacus, the Peripatetics, &c.

The second opinion, namely, that the substance of the earth or universe (for it is impossible to speak of the one without the other) was eternal, though not the form, was most generally held among the ancients. From their established axiom, that "nothing can be produced from nothing," they concluded that creation was impossible; but at the same time they thought they had good reason to believe the world had not been always in its present form. They who held this opinion may again be divided into two classes: first, those who endeavoured to account for the generation of the world, or its reduction into the present form, by principles merely mechanical, without having recourse to any allusion from divine power; and, secondly, those who introduced an intelligent mind as the author and disposer of all things. To the first of these classes belonged the cosmogony of the Cabalists, Phoenicians, and Egyptians; the particulars of which are too abstruse to deserve notice. Of the same opinion also were most of the poets; the philosophers Thales, Anaximander, Anaximenes, Anaxagoras, &c. The latter attempted to reform the philosophy of his master Anaximenes by introducing an intelligent being into the world distinct from matter; thus making his intelligent principle, or God, the soul of the world. Diogenes of Apollonia suppressed air, which he made the first principle of all things, to be ended with reason: His manner of philosophizing differed very little from that of Des Cartes. "All things (says he) being in

motion, some became condensed and others rarefied. In those places where condensation prevailed, a whirling motion or vortex was formed; which by its revolution drew in the red, and the lighter parts flying upwards formed the sun."

The most remarkable of the atheistic sytems, however, was the atomic one, supposed to have been invented by Democritus; though Laertius attributes it to Leucippus, and some make it much older. According to this system, the first principles of all things were an infinite multitude of atoms, or indivisible particles of different sizes and figures: which, moving fortuitously, or without design, from all eternity, in infinite space, and encountering with one another, became variously entangled during their contact. This first produced a confused chaos of all kinds of particles: which afterwards, by continual agitation, striking and repelling each other, dispossessed themselves into a vortex or vortices, where, after innumerable revolutions and motions in all possible directions, they at last settled into their present order.

The hypothesis of Democritus agrees in the main with that of Epicurus as represented by Lucretius; excepting that no mention is made of those vortices, which yet were an essential part of the former. To the two properties of magnitude and figure which Democritus attributed to his atoms, Epicurus added a third, namely, weight; and, without this, he did not imagine they could move at all. The system of Democritus necessarily introduced absolute fatal necessity; which Epicurus not choosing to agree to, he invented a third motion of the atoms, unknown to those who had gone before him. His predecessors allowed them to have a perpendicular and reflexive motion: but Epicurus, though he allowed those motions to be absolutely necessary and unavoidable, asserted that the atoms could also of themselves decline from the right line; and from this declination of the atoms he explained the free will of man.—The most material difference between the two systems, however, was, that Epicurus admitted no principle but the atoms themselves; whereas Democritus believed them to be animated.

Of those who held two distinct and coeternal principles, viz. God and Matter, we shall only take notice here of the opinions of Pythagoras, Plato, and Aristotle, as to, and being the most remarkable.

Pythagoras is said to have asserted two substantial self-existent principles: a monad, or unity; and a dyad, or duality. The meaning of these terms is now somewhat uncertain. Some think, that by the monad he meant the Deity, and by the dyad matter. Others think, that the Pythagorean monads were atoms. The dyad is sometimes thought to signify a demon or evil principle; but Porphyry's interpretation, which seems the most probable, is as follows. The caufe, says he, of that sympathy, harmony, and agreement which is in things, and of the conservation of the whole, which is always the same and like itself, was by Pythagoras called unity; that unity which is in the things themselves being but a participation of the first caufe: but the reason of difference, inequality, and constant irregularity in things, was by him called a dyad. This philosopher held numbers to be the principles...
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From these three laws, together with the two contrary forces of attraction and repulsion, Sir Isaac Newton and his followers have attempted to explain all the phenomena of nature. When they come to explain the nature of the attractive and repulsive forces, however, they are exceedingly embarrassed. Sir Isaac has expressed himself in two different ways concerning them. In his Principia, he pretends positively determines them to be owing to a cause that is not material; and in his Queries, he supposes they may be effects of some subtle matter which he calls ether. This disagreement with himself has produced no small disagreement among his followers. One party, laying hold of his assertions in the Principia, determined the world to be upheld by immaterial powers; while the other, neglecting the Principia, and taking notice only of the Queries at the end of the Optics, strenuously maintains, that attraction and repulsion are owing to the action of some exceedingly fine and subtle ether. — The first of these suppositions, it is argued, necessarily involves us in one of the following dilemmas. 1. If the attractive and repulsive forces are not material, they must either be occasioned by spiritual beings, or they must be qualities of matter. If they are occasioned by the action of immaterial beings, those beings must either be created or uncreated. If they are produced by the action of created beings, we run into the supposition of some of the ancient heathens, that the world is governed by demons or subordinate intelligences; and thus may make an easy transition to polytheism. If attraction and repulsion are the immediate action of the Deity himself, we run into the doctrine of making God the soul of the world. — This last hypothesis hath been most strenuously adopted by Mr Baxter in his treatise of the Immateriality of the human Soul. Mr Boscovich, Mr Mitchell, and Dr Priestley, have likewise adopted the hypothesis of immaterial powers to such a degree, that, according to them, the whole world consists of nothing else but attractive and repulsive forces surrounding physical points. 2. If we suppose the attractive and repulsive powers to be only properties, qualities, or laws, as they are supposed on matter, it may as well have been contented with the occult qualities of Aristotle. If attraction and repulsion are occasioned by the action of mere matter, and all the powers in nature are only material, the charge is incurred of making nature direct itself in such a manner, that there is no occasion for the interposition, or even the existence, of a Deity at all.

Thus we see, the Newtonian cosmogony must incline either to the Platonic and Aristotelian, or to the Atomic or Epicurean; according to the hypothesis we lay down concerning the nature of attraction. Des Cartes's system was plainly a revival of that of Democritus and Epicurus, with some corrections and improvements. It was further improved and corrected by Mr Hutchinson, who added to it the authority of Revelation. The created agents he chose in his cosmogony were fire, light, and air. Thence, we see, have indeed a very considerable share in the operations of nature; but unless we explain the manner in which they operate, our knowledge is not at all increased, and we might as well have contented with the Newtonian attraction and repulsion, or even the occult qualities of Aristotle. Attempts have indeed been made to solve the phenomena...
phenomena of nature, from the action of these three agents, both by Hutchillfon himself and many of his followers.—These attempts, however, have always proved unsuccessful. Some phenomena indeed may be explained pretty plausibly from the known action of these three; but when we come to speak of what may be called the nicer operations of nature, such as the growth of plants and animals, we are utterly at a loss.

The manifest deficiency of active principles in all the theories of the earth that have yet been invented, hath occasioned a contient fearch after others which should be, by their superior activity, to fill up the blank which necessarily remained in the system.—Pythagoras, Plato, and Aristotle, being unable to account for the formation of the earth from their four elements, called in the affittance of a fifth, which was never yet discovered. Epicurus, finding the motions attributed to his atoms by Democritus to be insufficient, had recourse to an imaginary, and on his own principles impossible, declination of the atoms. Des Cartes, finding the atoms themselves insufficient, asserted that they were not atoms, but might be broken into smaller parts, and thus confitute matter of various degrees of fulbility. The Newtonian philosophers have found Des Cartes's system insufficient; but being greatly diffrefled in their attempts to solve all the phenomena of nature by mere attraction and repulsion, have been obliged to call in the action of mind to their affittance. The Hutchinsonians were hardly put to it in accounting for every thing by the action of fire, light, and air, when luckily the discoveries in electricity came to their affittance. It must be owned, that this fluid does indeed come in like a kind of fifth element, which in many cafes appears to be the animating principle of nature. For some time past, almost all the remarkable phenomena in nature have been explained by electricity, or the action of the elecric fluid. But unlike this action is explained, we are not farther than we were before. To say that any thing is done by electricity, is not more intelligible than to say that it was done by attraction. If we explain an effect by a material cause, it ought to be done upon mechanical principles. We ought to be sensible how one part of matter acts upon another part in such a manner as to produce the effect we desire to explain. The electrical philosophers, however, have not yet been able to investigate the manner in which this fublime fluid operates; and hence the many discoveries in electricity have not contributed to throw that light on the theory of the earth, which perhaps they may do hereafter. With some philosophers, however, the electric fluid itself, and indeed all the powers of nature, were in danger of being superceded by a principle, lately very little known, called the phlogiston.—Thus, Mr Herly tells us, that Mr Clarke, an ingenious gentleman in Ireland, hath discovered all the different kinds of air produced from metals, &c. by Dr Priestley, to be only phlogisit vapours arising from these substances. Dr Priestley himself supposes, that the electric light is a modification of phlogiston; and consequently thinks it probable, that all light is a modification of the same. Fire or flame is thought to be a chemical combination of air with the phlogiston; and phlogiston is thought to give the elasticity to air, and every other elastic fluid, &c. Another party, seemingly jealous of the powers of this new principle, have denied its existence altogether, and in its stead introduced another equally insufficient, called the oxygenous principle. "Others have reduced all nature to the two principles called principium fusibile and principium proprium. All these, however, are shown, in other parts of this work, to be more inactive substances; the phlogiston, common charcoal; the oxygenous principle, water deprived of the quantity of phlogiston it usually contains; the principium fusibile, the flame; and the principium proprium, a name for the particular modification of the atoms, or what we pleafe to call the invisible effence of matter which distinguishes one body from another, and which must be for ever unknown to all human creatures.—Be this as it will, the late discoveries in electricity have tended very much to change the form of the Newtonian philosophy, and to introduce that materialism into our theories of the natural phenomena which is by some people so much complained of.

From this general history of the different agents which philosophers have chosen to account for the original formation of the earth, and for its preservation in its present form, it appears, that scarce any advance has yet been made. All the agents have been prodigiously defective; electricity itself, as far as yet known, not excepted. But before we enter into a particular consideration of these theories which seem most worthy of notice, it will be neceffary to point out the principal difficulties which stand in the way of one who attempts to give a complete theory of the earth.

1. The earth, although pretty much of a spherical figure, is not completely so; but protuberates considerably about the equatorial parts, and is proportionably flattened at the poles, as is undeniably proved by the observations of modern mathematicians. The question here is, Why the natural cause which gave the geophysical earth so much of a spherical figure, did not make it a complete and exact sphere?

2. The terraqueous globe consists of a vast quantity of water as well as dry land. In many places, such as the Isthmus of Darien, a narrow neck of land is interposed betwixt two vast oceans. These beat upon it on either side with vast force; yet the Isthmus is never broken down or diminished. The cause is the same with the Isthmus of Suez which joins Asia and Africa, and with that which joins the Morea or ancient Peloponnesus to the continent. The difficulty is, By what natural power or law are these narrow necks of land preserved amidst the waters which threaten them on both sides with destruction?

3. The surface of the earth is so smooth and equal, but in some places raised into numerous ridges of mountains, and in others sunk down in such a manner as to form deep valleys. These mountains, though they have been exposed to all the injuries of the weather for many thousands of years, exhibit no signs of decay. They still continue of the same size as before, though vast quantities of earth are frequently washed down from them by the rains, which together with the force of gravity, tending to level and bring them on an equality with the plains on which they stand, we might reasonably think, ought by this time to have rendered them smaller than before. It must therefore
Earth.

therefore by inquired into, By what natural cause the mountains were originally formed, and how they come to preserve their size without any remarkable diminution

4. The internal parts of the earth are still more wonderful than the external. The utmost industry of man, indeed, cannot penetrate but a little way into it. As far as we can reach, however, it is found to be compounded of dissimilar strata lying one upon another, not commonly in a horizontal direction, but inclined to the horizon at different angles. These strata seem not to be disposed either according to the laws of gravity or according to their density, but as it were by chance. Besides, in the internal parts of the earth are cavities and vacuities. By what means were these strata originally deposited, the figures and cavities made, &c.?

5. In many places of the earth, both on the surface and at great depths under it, vast quantities of marine productions, such as shells, &c. are to be met with. Sometimes these shells are found in the midst of solid rocks of marble and limestone. In the very heart of the earth, of its broken surface, as leaves, &c. are sometimes to be found. The question is, By what means were they brought thither?

These are some of the most striking difficulties which present themselves to one who undertakes to write a natural history or theory of the earth. The most remarkable attempts to produce a theory of this kind are the following.

Dr. Burnet's theory.

1. According to Dr. Burnet, the earth was originally a fluid mass, or chaos, composed of various substances differing both in density and figure. These which were most heavy, sank to the centre, and formed there a hard solid body; those which were specifically lighter remained next above; and the waters, which were lightest of all, covered the earth all round. The air, and other ethereal fluids, which are still lighter than water, floated above it, and surrounded the globe also. Between the waters, however, and the circumambient air was formed a coat of oily and mucous matter lighter than water. The air at first was very impure, and must necessarily have carried with it many of those earthy particles with which it was once blended: however, it soon began to purify itself, and deposit those particles upon the oily crust abovementioned; which, soon uniting together, the earth and oil became the crust of vegetable earth, with which the whole globe is now covered. His account of the destruction of the primeval world by the flood, by the falling down of the shell of earth into the waters of the abyss, is given under the article DELUGE. It only remains then to give his account of the manner in which he believes the earth from this universal destruction, and this he does as follows. These great masses of earth, says he, falling into the abyss, drew down with them vast quantities also of air; and by dashing against each other, and breaking into small parts by the repeated violence of the shock, they at length left between them large cavities filled with nothing but air. These cavities naturally offered a bed to receive the influent waters; and in proportion as they filled, the face of the earth became once more visible. The higher parts of its broken surface, now become the tops of mountains, were the first that appeared; the plains soon after came forward; and at length the whole globe was delivered from the waters, except the places in the lowest situations; so that the ocean and seas are still a part of the ancient abyss, that have had no place to which they might return. Islands and rocks are fragments of the earth's former crust; continents are larger masses of its broken substances; and all the cavities that are to be found on the surface of the present earth are effects of the confusion into which both earth and water were at that time thrown.

II. Dr. Woodward begins with affecting, that all terrestrial substances are disposed in beds of various natures, lying horizontally one over the other, somewhat like the coats of an onion: that they are not only in shells and other productions of the sea; these shells being found in the deepest cavities, and on the tops of the highest mountains. From these observations, which are warranted by experience, he proceeds to observe, that these shells and extraneous foils are not productions of the earth, but are all actual remains of those animals which are known to be reformed; that all the strata or beds of the earth lie under each other in the same kind of gravity, and that they are disposed as if they had been left there by subfiding waters. All this he very confidently affirms, tho' daily experience contradicts him in some of them; particularly, we often find layers of stone over the lightest foils, and the softest earth under the hardest bodies. However, having taken it for granted, that all the layers of the earth are found in the order of their specific gravity, the lightest at top, and the heaviest next the centre, he consequently affers, that all the substances of which the earth is composed were originally in a state of dissolution. This dissolution he supposes to have taken place at the flood; but being aware of an objection, that the shells, &c. supposing to have been deposited at the flood are not dissolved, he excepts them from the solvent powers of the waters, and endeavours to show that they have a stronger cohesion than minerals; and that while even the hardest rocks are dissolved, bones and shells may remain entire.

III. Mr. Whiston supposes the earth to have been originally a comet; and considers the Mosiac account of the creation as commencing at the time when the Creator placed the comet in a more regular manner, and made it a planet in the solar system. Before that time, he supposes it to have been a globe without beauty or proportion; a world in disorder, subject to all the vicissitudes which comets endure; which, according to the present system of philosophy, must be alternately exposed to the extremes of heat and cold. These alternations of heat and cold, continually melting and freezing the surface of the earth, he supposes to have produced, to a certain depth, a chaos resembling that described by the poets, surrounding the solid contents of the earth, which still continued unchanged in the midst; making a great burning globe of more than 2000 leagues in diameter. This surrounding chaos, however, was far from being folid: he resembles it to a dense, though fluid atmosphere, composed of substances mingled, agitated, and shocked against each other; and in this disorder he supposes the earth to have been just at the eve of the Mosiac creation. But upon its orbit being then changed, when it was more regularly wheeled round the sun, every thing took its proper place, every part of the surrounding fluid then fell
fell into a certain situation according as it was light or heavy. The middle or central part, which always remained unchanged, still continued so; retaining a part of that heat which it received in its primeval approaches towards the sun; which heat it calculates may continue about 6000 years. Next to this fell the heavier parts of the chaotic atmosphere, which serve to sustain the lighter: but as in defending they could not entirely be separated from many watery parts with which they were intimately mixed, they drew down these also along with them; and these could not mount again after the surface of the earth was consolidated: they therefore surrounded the heavy first-defending parts in the same manner as these surrounded the central globe. Thus the entire body of the earth is composed next the centre of a great burning globe: next this is placed an heavy terrene substance that encompasses it; round which is circumcised a body of water. Upon this body of water is placed the crust of earth on which we inhabit: so that according to Mr Whilton, the globe is composed of a number of coats or shells, one within the other, all of different densities. The body of the earth being thus formed, the air, which is the lightest substance of all, surrounded its surface: and the beams of the sun darting through, produced the light, which, we are told by Moses, first obeyed the divine command.

The whole economy of the creation being thus adjusted, it only remained to account for the risings and depredations on the surface of the earth, with the other seeming irregularities of its present appearance. The hills and valleys are by him considered as formed by the preping upon the internal fluid which sustains the external shell of earth, with greater or less weight: those parts of the earth which are heaviest sink the lowest into the subjacent fluid, and thus become valleys: those that are lightest rise higher upon the earth's surface, and are called mountains.

Such was the face of nature before the deluge: the earth was then more fertile and populous than it is at present: the life of men and animals was extended to its full power, the genial principle was also much greater than at present; vegetation and animal increase were carried on with more vigour; and all nature seemed teeming with the feeds of life. But as these advantages were productive only of moral evil, it was found necessary to destroy all living creatures by a flood; and in what manner this punishment was accomplished, according to Mr Whilton, is particularly taken notice of under the article of Deluge.

Mr Buffon's theory differs very widely from the foregoing. He begins with attempting to prove, that this world which we inhabit is no more than the ruins of a world. "The surface of this immense globe (says he) exhibits to our observation, heights, depths, plains, seas, marshes, rivers, caverns, gulfs, volcanoes; and on a cursory view, we can discover in the disposition of these objects neither order nor regularity. If we penetrate into the bowels of the earth, we find metals, minerals, stones, bitumens, sands, earths, waters, and matter of every kind, placed as it were by mere accident, and without any apparent design. Upon a nearer and more attentive inspection, we discover sunk mountains, caverns filled up, shattered rocks, whole countries swallowed up, new islands emerged from the ocean, heavy substances placed above light ones, hard bodies included within soft bodies: in a word, we find matter in every form, dry and humid, warm and cold, solid and brittle, blended in a chaos of confusion, which can be compared to nothing but a heap of rubbish, or the ruins of a world."

When taking a particular survey of the external surface of the globe, he begins with the ocean, and the motion communicated to it by the influence of the sun and moon which produces the tides.—"In examining the bottom of the sea (says he), we perceive it to be equally irregular as the surface of the dry land. We discover hills and valleys, plains and hollows, rocks and earths of every kind; we discover likewise, that islands are nothing but the summits of vast mountains, whose foundations are buried in the ocean. We find other mountains whose tops are nearly on a level with the surface of the water; and rapid currents which run contrary to the general movement. These sometimes run in the same direction; at other times their motion is retrograde; but they never exceed their natural limits, which seem to be as immutable as those which bound the efforts of land-rivers. On one hand we meet with tempestuous regions, where the winds blow with irresistible fury; where the heavens and the ocean, equally convulsed, are mixed and confounded in the general shock; violent intense motions, tumultuous swellings, water-sprouts, and strange agitations produced by volcanoes, whose mouths, the many fathom below the surface, vomit forth torrents of fire; and pulv, even to the clouds, a thick vapour, composed of water, sulphur, and bitumen; and dreadful gulphs or whirlpools, which seem to attract vessels for no other purpose than to swallow them up. On the other hand we discover vast regions of an opposite nature, always smooth and calm, but equally dangerous to the mariner. To conclude, directing our eyes towards the southern or northern extremities of the globe, we discover huge mists of ice, which, attaching themselves from the polar regions, advance, like floating mountains, to the temperate climates, where they disolve and vanish from our view. The bottom of the ocean and the shelving sides of rocks produce plentiful crops of plants of many different species; its soil is composed of sand, gravel, rocks, and shells; in some places it is a fine clay, in others a compact earth; and in general, the bottom of the sea has an exact resemblance to the dry land which we inhabit.

"Let us next take a view of the dry land. Upon an attentive observation of this, we will find, that the great chains of mountains lie nearer the equator than the poles; that in the old continent their direction is more from east to west than from north to south; and that, on the contrary, in the new continent they extend more from north to south than from east to west. But what is still more remarkable, the figure and disposition of these mountains, which have a most irregular appearance, corresponds wonderfully, that the prominent angles of one mountain are confined opposite to the concave angles of the neighbouring mountain, and of equal dimensions, whether they be separated by an extensive plain or a small valley. I have further
From these positions, which he lays down as facts, Mr Buffon draws the following conclusion.

1. The changes which the earth has undergone within the last 2000, or 3000 years must be inconceivable, when compared with the great revolutions that took place in those ages immediately succeeding the creation. The reason he gives for this assertion, is, that terrestrial substances could not acquire solidity but by the continued action of gravity; hence the earth must have been originally much softer than it is now, and therefore more apt to be changed by causes which cannot now effect it.

2. It seems an incontrovertible fact, that the dry land which we now inhabit, and even the summits of the highest mountains, were formerly covered with the waters of the sea; shells and other marine bodies are still found on the very tops of mountains.

3. The waters of the sea have remained for a long period of time upon the surface; because in many places, such immense banks of shells have been discovered, that it is impossible to great a multitude of animals could exist at the same time.

4. From this circumstance it likewise appears, that although the materials on the surface of the earth were then soft, easily detached, moved, and transported by the waters, yet these transportations could not be suddenly effected; they must have been gradual and successive, as sea-bodies are sometimes found more than 1000 feet below the surface; and such a thickness of earth or stone could not be accumulated in a short time.

5. It is impossible these effects could be owing to the universal deluge. For though we should suppose that all the shells in the bottom of the ocean should be deposited upon the dry land; yet, besides the difficulty of establishing this supposition, it is plain, that as shells are found incorporated in marble, and in the rocks of the highest mountains, we must suppose these rocks and marbles to have been formed all at the very instant when the deluge took place; and that before this great revolution, there were neither mountains, nor marbles, nor rocks, nor clays, nor matter of any kind similar to what we are now acquainted with; as they all, with few exceptions, contain shells and other productions of the ocean. Besides, at that time of the universal deluge, the earth must have acquired a considerable degree of solidity, by the action of gravity for more than 16 centuries. During the short time the deluge lasted, therefore, it is impossible that the waters should have overturned and dissolved the whole surface of the earth to the greatest depths.

6. It is certain (for what reason he does not mention), that the waters of the sea have, at some period or other, remained for a succession of ages upon what we now know to be dry land; and consequent upon that vast confluence of Asia, Europe, Africa, and America, were then the bottom of an immense ocean, replete with every thing which the present ocean produces.

7. It is likewise certain, that the different strata of the earth are horizontal and parallel with each other. This parallel situation must therefore be owing to the operation of the waters, which have gradually accumulated the different materials, and given them the same position which the water itself invariably assumes.

8. It is certain that these strata must have been gradually.
No other cause than the motion and sediments of water could possibly produce the regular position of the various strata of which the superficial part of this earth consists. The highest mountains are composed of parallel strata, as well as the lowest valleys. Of course, the formation of mountains cannot be attributed to the shock of earthquakes, or to the eruptions of volcanoes. Such small eminences as have been raised by volcanoes or convulsions of the earth, instead of being composed of parallel strata, are mere masses of weighty materials, blended together in the utmost confusion.

Having now, as he thinks, proved, that the dry and habitable part of the earth has remained for a long time under the waters of the sea, and consequently must have undergone the same changes that now take place at the bottom of the sea, he proceeds to enquire what these changes are.

10. The ocean, since the creation of the world, has been constantly agitated by the tides, occasioned by the motion of the sun and moon; and this agitation is greater in the equatorial than in the other parts of the globe, because the motion of the sun and moon is stronger.

11. The earth performs a rapid motion on its axis; and consequently its parts have a centrifugal force, which is also greatest at the equator.

12. From the combined action of the two last mentioned causes, the tides and the motion of the earth, it may be fairly concluded, that although this globe had been originally a perfect sphere, its diurnal motion, and the ebbing and flowing of the tides, must necessarily, in a succession of time, have elevated the equatorial parts, by gradually carrying mud, earth, sand, shells, &c. from other climates, and depositing them at the equator.

13. On this supposition, the greatest inequalities on the surface of the earth ought to be found, and in fact are found, in the neighbourhood of the equator.

14. As the alternate motion of the tides has been constant and regular since the existence of the world, it is natural to think, that at each tide, the water carries from one place to another a small quantity of matter, which falls to the bottom as a sediment, and forms those horizontal and parallel strata that every where appear. Here it may indeed be objected, that as the flux is equal to, and regularly succeeded by, the reflux, the two contrary motions will balance each other; and whatever is brought in by the flux will be carried back by the reflux. The motion of the ocean, therefore, could never be the cause of the formation even of parallel strata; much less of mountains, and all the inequalities to be observed in this globe. To this Mr Buffon replies, that the alternate motion of the waters is by no means equal; for the sea has a continual motion from east to west; the agitations occasioned by the wind, and the surface produce great inequalities in the tides. It must also be acknowledged, that, by every motion of the sea, particles of earth and other matter must be carried from one place and deposited in another; and that these collections of matter must assume the form of parallel and horizontal strata. Lastly, this objection is obviated by a well known fact. On all coasts where the ebbing and flowing of the sea is discernible, numberless materials are brought in by the flux, which are not carried back by the reflux. The sea gradually increases on some places and recedes from others, by exceeding its limits by depositing earth, sand, shells, &c. which naturally take a horizontal position. These materials when accumulated, and elevated to a certain degree, gradually shut out the water, and remain for ever in the form of dry land.

15. The possibility of a mountain's being formed at the bottom of the sea by the motion and sediments of the water, will appear from the following considerations. On a coast which the sea washes with violence during the flow of tide, some part of the earth must be carried off at every stroke of the waves. Even where the sea is bounded by a rock, it is a known fact, that the rock itself is greatly washed by the water; and consequently that small particles are carried off by the retreat of every wave. If these particles of earth or stone are necessarily transported to some distance. Whenever the agitation of the water ceases, the particles are precipitated in the form of a famenti, and lay the foundation of a first stratum, which is either horizontal or inclined, according to the situation of the surface on which they fall. This stratum is soon succeeded by another, produced by the same cause; and thus a considerable quantity of matter will be amalgamated, and deposited in parallel beds. In process of time this gradually accumulating mass will become a mountain in the bottom of the sea, exactly resembling, both in external and internal structure, those mountains which we see on the dry land. If there happened to be shells in that part of the bottom of the sea where we have supposed the sediments to be deposited, they will be covered, filled, and incorporated with the deposited matter, and form a part of the general mass. These shells will be lodged in different parts of the mountain, corresponding to the times in which they were deposited: these which lay at the bottom before the first stratum was formed, will occupy the lowest station; the others will be found in places more elevated.

16. It has been imagined that the agitation of the sea produced by the winds and tides is only superficial, and does not affect the bottom, especially where it lies very deep. But it ought to be remembered, that whatever be the depth, the whole mass is put in motion by the tides at the same time; and that, in a fluid globe, this motion would be communicated even to the centre. The attractive power which occasions the flux and reflux, is penetrating. It acts equally upon every particle of the mass; so that the quantity of its force at different depths may be determined by calculation. We cannot therefore hesitate in pronouncing that the tides, the winds, and all other causes of motion in the sea, must produce heights and inequalities in its bottom; and that these heights must uniformly be composed of regular strata either horizontal or inclined. The heights thus produced will gradually augment; like the waves which formed them, they will mutually respect each other; and if the extent of the
Earth was deferted by proceeds to answer other quereions which seem the ocean, more difficult of solution. Between two neighbouring heights in the bottom of the ocean there must be a current which will follow their common direction, and, like a river, cut a channel, the angles of which will be alternately opposite through the whole extent of its course. These heights must continually increase: for during the flow, the water will deposit its ordinary sediment upon their ridges; and the waters which are impelled by the current will force along, from great distances, quantities of matter, which will subside between the hills, and, at the same time, form a valley with corresponding angles at their foundation. Now, by means of these different motions and sediments, the bottom of the ocean, though formerly smooth, must soon be furrowed and interpersed with hills and chains of mountains, and as we actually find it at present. These great materials of which the eminences were originally composed, would gradually harden by their own gravity. Such of them as consisted of sandy and crystalline particles would produce those enormous masses of rock and flint, in which we find crystals and other precious stones. Others, composed of fiony particles mixed with shells, give rise to those beds of limestone and marble in which vast quantities of sea-shells are still found incorporated.

18. Thecauæs, as before observed, act with greater force under the equator than in other climates; for there the tides are higher, and the winds more uniform. The mountains of Africa and Peru are the highest in the world; often extending through whole continents, and stretching to great distances under the waters of the ocean. The mountains of Europe and Asia, which extend from Spain to China, are not so high as those of Africa and South America. According to the relations of voyagers, the mountains of the north are yet small hills, when compared with the mountains of the equatorial regions. These prodigious chains of mountains which run from east to west in the old continent, and from north to south in the new, must have been formed by the general motion of the tides. But the origin of the less considerable hills must be ascribed to particular motions occasioned by winds, currents, and other irregular agitation of the sea.

Having thus discussed some very important points respecting the theory of the earth, our author now proceeds to answer other questions which seem still more difficult of solution.

19. But how has it happened that this earth, which we and our ancestors have inhabited for ages, which, from time immemorial, has been an immense continent, dry, compact, and removed from the reach of water, should, if formerly the bottom of an ocean, be now exalted to such a height above the waters, and so completely separated from them? Since the waters remained so long upon the earth, why have they now deserted it? What accident, what cause, could introduce a change so great? A little reflection, says he, will furnish us with at least plausible solutions to these seemingly so difficult questions. We daily observe the sea gaining ground on certain coasts, and losing it on others. We know that the ocean has a general and uniform motion from east to west; that it makes violent efforts against the rocks and low grounds which encircle it; that there are whole provinces which human industry can hardly defend against the fury of the waves; and that there are inlands which have but lately emerged from the waters, and of regular inundations. History informs us of inundations and deluges of a more extensive nature. Ought not all this to convince us, that the surface of the earth has experienced very great revolutions, and that the sea may have actually given up possession of the greatest part of the ground which it formerly occupied? For example, let us suppose, that the old and new worlds were formerly but one continent; and that, by a violent earthquake, the ancient Atlantis of Plato was sunk. The consequence of this mighty revolution must necessarily be, that the sea would rush in from all quarters, and form what is now called the Atlantic Ocean; and vast continents, perhaps those we now inhabit, would of course be left dry. This great revolution might be effected by the sudden failure of some immense cavern in the interior parts of the globe, and an universal deluge would infallibly succeed.

20. But, however, conjectures of this kind may stand, it is certain that such a revolution hath happened: and we may even believe that it hath happened naturally; for if a judgment of the future is to be formed from the past, we have only to attend carefully to what pulses before our eyes. It is a fact established by the repeated observation of voyagers, that the ocean has a constant motion from east to west. This motion, like the trade-winds, is not only perceived between the tropics, but through the whole temperate climates, and as near the poles as navigators have approached. As a necessary consequence of this motion, the Pacific Ocean must make continual efforts against the coasts of Tartary, China, and India; the Indian Ocean must act against the east coast of Africa; and the Atlantic must in a similar manner act against all the eastern coasts of America. Hence the sea must have gained, and will always continue to gain, on the east, and to lose on the west. This of itself would be sufficient to prove the possibility of the change of the sea into land, and land into sea. If this is the natural effect of the sea's motion from east to west, may it not reasonably be supposed, that Asia, and all the eastern continent, is the most ancient country in the world? and that Europe, and part of Africa, especially the west parts of these continents, as Britain, France, Spain, &c. are countries of a more recent date?

21. The cause of the perpendicular fissures with which the earth abounds, is easily investigated. As various materials constituting the different strata were transported by the waters, and deposited in the form of sediments, they would at first be in a very diluted state, and would gradually harden and part with the superfluous quantity of moisture they contained. In course of time, drying, they would naturally contract and split at irregular distances. These fissures necessarily inclined a perpendicular direction: because in this direction the action of gravity of one particle upon another is equal to nothing; but it acts directly opposite to this description, in a horizontal situation: the di-
account

minution in bulk could have no sensible effect but in a vertical line. The contraction of the parts in drying, therefore, and not the continued water forcing an inch, as has been alleged by some, is the cause of perpendicular fissures: for it may be often remarked, that the sides of those fissures, through their whole extent, correspond as exactly as the two sides of a split piece of wood.

22. Perpendicular fissures vary greatly as to the extent of their openings. Some are about half an inch or an inch; others a foot or two feet; some extend several fathoms, and give rise to those vast precipices which so frequently occur between opposite parts of the same rocks, in the Alps and other high mountains. It is plain, that the fissures, the openings of which are small, have been occasioned solely by drying. But those which extend several feet are partly owing to another cause. They could be ascribed to another cause. They could be attributed to the impulsion of a comet. The possibility of driving off such a quantity of matter from the sun by a single stroke, he labours hard to prove; but this is far from being the greatest difficulty in this system.—"To this theory (says he) it may be objected, that if the planets had been driven off from the sun by a comet, in place of describing circles round him, they must, according to the law of projectiles, have returned to the same place from whence they had been forced; and therefore, that the projectile force of the planets cannot be attributed to the impulse of a comet."

"I reply, that the planets ifled not from the sun in the form of globes, but in the form of torrents; the motion of whose anterior particles behaved to be accelerated by those behind, and the attraction of the anterior particles would also accelerate the motion of the posterior; and that this acceleration, produced by one or both of these causes, might be such as would necessarily change the original motion arising from the impulse of the comet; and that, from the cause, might refult a motion similar to what takes place in the planets; especially when it is considered, that the shock of the comets removes the sun out of its former station. This reasoning may be illustrated by an example. Suppose a musket-ball discharged from the top of a mountain, and that the force of the powder was sufficient to send it beyond a semidiameter of the earth: it is certain that this ball would revolve round the earth, and return at every revolution to the place from whence it had been discharged. But, instead of a musket-ball, if a rocket were employed, the continued action of the fire would greatly accelerate the original
Earth.

original impulsive motion. This rocket would by no means return to the same point like the ball; but, cic·
eris paribus, would describe an orbit, the perigee of which would be more or less distant from the earth in proportion to the greatness of the change produced in its direction by the accelerating force of the fire. In the same manner, if the original projectile force impressed by the comet on the torrent of fallout matter was accelerated, it is probable that the planets formed by this torrent acquired their circular or elliptical movements around the sun.

In like manner he accounts for the formation and circulation of the secondary planets. The revolutions of the primaries on their axes, he accounts for from the obliquity of the original stroke impressed by the comet. The oblate spheroidal figure of the earth is easily deduced from its diurnal motion, and the fluidity of the whole at its first formation. The flattening at the poles he estimates at about one 230th part of the whole. As this computation differs considerably from the account given by the mathematicians who were sent to examine the effects of the comet on the torrent, by the mutual attraction of its parts, took on a globular figure, which its diurnal motion changed into a spheroid; that when the earth cooled, the vapours which were expanded like the tail of a comet, gradually condensed, and fell down in the form of water upon the surface, deposing at the same time a slimy substance mixed with sulphur and ashes; part of which was carried by the motion of the waters into the perpendicular fissures of the strata, and produced metals; and the rest remained on the surface, and gave rise to the vegetable mould which abounds in different places, with more or less of animal or vegetable particles, the organization of which is not obvious to the senses.

Thus the interior parts of the globe were originally composed of vitrified matter; and, I believe they are so at present. Above this vitrified matter were placed those bodies which the fire had reduced to the smallest particles, as sands, which are only portions of gla.s, and above these pumice-stones and the froth of melted matter, which produced the different clays. The whole was covered with water to the depth of 500 or 600 feet, which originated from the condensation of the vapours when the earth began to cool. This water deposited a stratum of mud, mixed with all those matters which are capable of being sublimed or exhaled by fire: and the air was formed of the most flimsy vapours, which, from their levity, rose above the water.

Such was the condition of the earth when the tides, the winds, and the heat of the sun, began to introduce changes on its surface. The diurnal motion of the earth, and that of the tides, elevated the waters in the equatorial regions, and necessarily transported thicker great quantities of lime, clay, and sand; and by thus elevating those parts of the earth, they perhaps sunk those under the poles about two leagues, or a 230th part of the whole, as was formerly remarked: for the waters would easily reduce into powder pumice-stones, and other spongy parts of the vitrified matter upon the surface; and by this means excavate some places and elevate others, which, in time, would produce islands and continents, and all those inequalities on the surface, which are more considerable towards the equator than towards the poles. The highest mountains lie between the tropics and the middle of the temperate zones, and the lowest from the polar circles towards the poles. Indeed, both the land and sea have most inequalities between the tropics, as is evident from the incredible number of islands peculiar to those regions.

V. In the first volume of the Edinburgh Philosophical Transactions a new theory of the earth has been laid down at considerable length by Dr Hutton; of which the following is an abstract.

The general view of the terrestrial system conveys to our minds an idea of a fabric, erected in wisdom, to obtain a purpose worthy of the power that is apparent in the production of it.

The end for which it was formed, as far as we can comprehend our author's meaning, is, that it might be an habitation for living creatures; and we are enabled to understand the constitution of this earth as a thing formed by design, "not only by seeing those general operations which depend on its construction as a machine, but also by perceiving how far the particulars in the construction of that machine depend on the operations of the globe."

In taking a comprehensive view of the mechanism of the globe, we observe three principal parts of which three it is composed; and which, by being properly adapted to one another, form it into an habitable world. These three parts are the solid body of the earth, the waters of the ocean, and the atmosphere surrounding the whole. On these our author observes,

1. The parts of the terrestrial globe more immediately exposed to our view are supported by a central body commonly supposed, but without any good reason, to be solid and inert.

2. The aqueous part reduced to a spherical form by gravitation, has become oblate by the earth's centrifugal force. Its use is to receive the rivers, be a fountain of vapours, and to afford life to innumerable animals as well as to be the source of growth and circulation to the organized bodies on earth.

3. The irregular body of land, raised above the level of the sea (though the smallest of these large divisions), is by far the most interesting, as immediately necessary to the support of animal life.

4. The atmosphere surrounding the whole is evidently necessary for innumerable purposes of life and vegetation, neither of which could subsist a moment without it.

Having thus considered the mechanism of the globe, Dr Hutton proceeds to investigate the powers by which it is upheld. These are the gravitating and upholding projectile forces by which the planets are guided, the
influence of light and heat, cold and condensation; to which may be added electricity and magnetism.

In the further pursuit of our general or preparatory ideas, the Doctor observes, that "a solid body of land could not have answered the purpose of a habitable world, for a foil is necessary for the growth of plants; but a foil is only the materials collected from the destruction of the solid land. Therefore the surface of this land, inhabited by man, is made by nature to decay, in dissolving from the hard and compact state in which it is found below the foil; and this foil is necessarily washed away by the continual circulation of the water running from the summits of the mountains." Thus he supposes that the land must at last be entirely destroyed; a misfortune unavoidable from the very constitution of the globe as a habitable world. It remains, therefore, to be considered, whether there be, "in the constitution of this world, a productive operation by which a ruined constitution may be again repaired, and a duration and stability procured to the machine considered as capable of sustaining plants and animals?" The solution of this question, he says, is perhaps within the reach of human fagacity, and, as he justly observes, might add some lustre to science and the human intellect.

With regard to the beginning of the world, though our author does not pretend to lay aside the Mofal accounts concerning the origin of man, yet, he says he, "though there has not been found in natural history any document by which a high antiquity might be attributed to the human race, this is not the case with regard to the inferior animals, particularly those which inhabit the ocean and its shores. We find in natural history monuments which prove that these animals had long existed; and we thus procure a measure for the computation of a period of time extremely remote, though far from being exactly ascertained.—Thus, in finding the relics of sea animals of every kind in the tender body of the earth, a natural history of those animals is formed, which includes a certain portion of time; and for the ascertaining this portion of time, we must again recur to the operations of nature.

From a view of the present constitution and operations of nature, therefore, our author supposes, that we may understand what has formerly passed in the original formation of the globe; and then proceeds to reason in the following manner.

The solid parts of the globe are, in general, composed of sand, gravel, argillaceous and calcareous strata, or of these mixed with some other substances. Sand is separated and fixed by streams and currents; gravel is formed by the mutual attrition of bones agitated in water; and marly and argillaceous strata have been collected by subduing in water in which those earthly substances had floated. Thus, so far as the earth is formed of these materials, it would appear to have been the production of water, winds, and tides.

The next inquiry of our author is into the origin of our land, which he seems willing to derive entirely from the exuviae of marine animals. The only argument he makes use of for determining this most important point is drawn from the quantity of them to be met with in the different parts of it. "We find (says he) the marks of marine animals in the most solid parts of the earth; consequently those solid parts have been formed after the ocean was inhabited by those animals which are proper to that fluid medium."

That all the masses of marble or lime-stone are composed of the calcareous matter of marine bodies, he concludes, 1. From there being few in which some of those objects may not be found which indicate the marine origin of the mafs; and a single cockle-shell or piece of coral found in a marble or lime-stone quarry, will certainly prove it to have been originally at the bottom of the sea as much as if it had been all composed of such bodies. 2. In the calcareous strata, which are evidently of marine origin, there are many parts of a sparry structure; which shows that in these places the original texture of those beds has been dissolved and a new structure formed. This change is produced by crystallization, in consequence of a previous state of fluidity; which has so disposed the concreting parts, as to allow them to assume a regular shape and structure proper to that substance. 3. There are, in all the regions of the earth, huge masses of calcareous matter in that crystalline or sparre state, in which perhaps no vestige can be found of any organized body, nor any indication that such calcareous matter had belonged to animals; but as, in other masses, this sparre or crystalline state is evidently assumed by the calcareous matter of the marine productions, we have no reason to derive thefe from any other source; and hence, says our author, we are led to conclude, that all the strata of the earth, not only those consisting of such calcareous masses, but others superincumbent upon these, have had their origin at the bottom of the sea, by the collection of sand and gravel, of shells, of coralline and crustaceous bodies, and of earths and clays variously mixed, or separated and accumulated.

"The general amount of our reasonings (says he) is this; that nine-tenths perhaps, or 99 hundredths, of this earth, so far as we see, have been formed by natural operations; formations of the globe, in collecting loose materials and depositing them at the bottom of the sea, confolidating those collections in various degrees, and either elevating them into confolidated masses at the level on which they were formed, or lowering the level of that mass."

With regard to the raising of the land, thus formed at the bottom of the sea, to some height above its surface, our author differs from Buffon, and contends that "no motion of the sea occasioned by the earth revolving in this solar system could bring about that end; for let us suppose the axis of the earth to be changed from the present poles and placed in the equinoctial line, the consequence of this might indeed be the formation of a continent of land about each new pole, from whence the sea would run towards the new equator; but all the rest of the globe would remain an ocean. Some new points might be discovered, and others which appeared before, the surface of the earth being a circle; but on the whole, land could only be gained substantially at the poles. Nor could the continents, even supposing they had been originally produced in this manner, have continued stationery for many thousand years, and presented to us, every where below their surface, masses of consolidated marble and other mineral substances, in a state as different as possible from what they were originally. Besides an operation, therefore, by which the
This consolidating power, he is of opinion, dissolved action — water as a constituent; for, in the case of materials accumulated in the bottom of the ocean, there is no proper means for separating the dissolved matter from the water included in these enormous masses; nor are there any means by which a circulation in those masses may be formed.

In the further prosecution of this subject, our author informs us, that "if water had been the menstrum by which the consolidating matter was introduced into the cavities of the strata, masses of those bodies that are soluble in water could only be found consolidated, and these only in such a state as the simple separation of the dissolving water might produce. But this is far from being the case. We have strata consolidated by calcareous spar; a thing perfectly distinguishable from solidified by the flatalitical concretion of the calcareous earth in consequence of aqueous solution. We have strata made solid by the formation of fluor; a substance, so far as we know, not soluble in water. We have strata consolidated with sulphureous and bituminous substances, which do not correspond to the solution in water. We have strata consolidated with siliceous matter in a state totally different from that in which it is deposited by water; we have them also consolidated by almost all the various metallic substances, with their almost endless mixtures and sulphureous compositions; that is to say, we find perhaps every different substance introduced into the interstices of strata which had been formed by sublimation at the bottom of the sea."

For these reasons, our author thinks it more probable that the strata have been consolidated by heat and fusion; and this hypothesis, he imagines, will solve every difficulty. And as the question is of the greatest importance to natural history, he proposes to investigate it at great length; at the same time that the subject is generalized as much as possible.

He considers, that among the various strata which compose the earth, we find some strata formed of siliceous and some of sulphureous materials; and with one or other, or both of these substances, the strata are so intimately mixed, that it is almost impossible to separate the sulphurous from the siliceous materials from a fluid to a solid state, much less to make them material affected the strata which contain them. The former he looks upon as absolutely insoluble in water; and there are many other bodies whose solubility is so small, that it could not be discovered but by means of the siliceous matter. Of this an instance is adduced in the feldspar, a compound of siliceous, argillaceous, and calcareous earth, intimately united together; which being for ages exposed to the weather, the calcareous part is dissolved, and the siliceous left in the form of a white silt earth, though it is uncertain whether this dissolution be performed by means of the water, or whether an acid be also concerned. Siliceous matter is undoubtedly contained in the water of the boiling fountain of Geyser in Ireland; but he thinks that here it must be dissolved by an alkaline fluid, one of the natural solvents of thisdistrict. It may therefore be asserted (says he), that no siliceous body having the hardness of flint, nor any crysallization of that substance, has ever been formed except by fusion. If by any art this substance shall be dissolved in simple water, or made to crysallize from any solution, in that case the affrtion which has been here made may be denied."
But before this proof he adduces another, supposed to be more direct; and that is, the penetration of many bodies with a flinty substance, which, according to every collateral circumstance, must have been performed by the flinty matter in a state of simple fusion, and not in a state of suspension by any solvent. Flinty bodies are found perfectly infiltrated in strata of chalk and sand: and here our author determines that it is not possible that flint matter could be conveyed into the middle of these strata by a menstruum in which it was dissolved, and thus deposited in that place, without the smallest trace of deposition in the neighbouring parts. The form of these bodies also demonstrates, in his opinion, 1. That they have been introduced among those strata in a fluid state, by injection from some other place; 2. That they have been deposited in a variety of ways among those strata then deeply immersed at the bottom of the sea; and, 3. That they have been there congealed from the state of fusion, and have remained in that situation, while those strata have been removed from the bottom of the ocean to the surface of the present land.

There are also specimens brought from many different places, which contain in themselves the most evident marks of this injection of the flinty substance in a fluid state; and these are pieces of fossil wood brought from England, Germany, and Loch Neagh in Ireland. Sometimes these specimens appear to have been previously penetrated by an iron or calcareous matter, and sometimes not: "the inject ed flint, however (says he), appears to have penetrated the body of this wood immersed at the bottom of the sea, under an immense compression of water. This appears from the wood being penetrated partially, some parts not being penetrated at all. Now, in the limits between these two parts, we have the most convincing proofs that it had been flint in a simple fluid state which had penetrated the wood, and not in a state of solution.

"Firstly, because, however little of the wood is left unpene trated, the division is always distinct between the inject ed flint and that which is not penetrated by the fluid flint. In this case the flinty matter has proceeded a certain length, which is marked, and no farther; and beyond this boundary there is no partial impregnation, nor a gradation of the infiltrating operation, as there must have been if flinty matter had been deposited from a solution. 2dly, The termination of the flinty impregnation has assumed such a form precisely as would have happened naturally from a fluid flint penetrating that body.

"In other specimens of this mineralizing operation, fossil wood, penetrated more or less with ferruginous or calcareous substance, has been afterwards penetrated with a flinty substance. In this case, with whatever different substances the woody body shall be supposed to have been penetrated in a state of solution by water, the regular structure of the plant would still have remained, with its vacuities variously filled with the petrifying substances, separated from the aqueous menstruum, and deposited in the vascular structure of the wood.

"There cannot be a doubt with regard to the truth of this proposition; for, as it is, we frequently find parts of the consolidated wood with the vascular structure remaining perfectly in its natural shape and situation; but if it had been by aqueous solution that the wood had been penetrated and consolidated, all the parts of that body would be found in the same natural shape and situation.

"This, however, is far from being the case; for while in some parts the vascular structure is preserved entire, it is also evident, that in general the woody structure is variously broken and dissolved by the fusion and crystallization of the flint.

With regard to the second kind of substances to be of the fulphurous race, he tells us, "that they are not soluble in water, so far as we know, but fusible by heat, and inflammable by means of heat and vital air. They are either more simple or more compound. The former consist of phlogiston united either with acid or metallic substances, the one forming sulphur, properly so called, the other metals. The more compound kind are composed of oily matter produced by vegetables, and forming bituminous substances.

"Sulphur is found naturally combined with metals, which are said to be mineralized by it; and it is well known that this mineralization is performed by means of heat and fusion; nor will any person skilled in chemistry pretend to say that this is done in the way of aqueous solution. The combination of iron and sulphur, for instance, may be easily performed by fusion; but this compound is resolved into a vitriolic salt by aqueous solution."

Our author further remarks, that unless all the substances of this kind were soluble in water, we ought not to say that any one of them is formed by aqueous solution; for there is such a continued chain of connection between them, that all must have been formed either by aqueous solution or by means of heat and fusion. In one mass, for instance, we find, 1. Pyrites, containing sulphur, iron, and copper; 2. Blake, containing iron, sulphur, and calamine; 3. Gailen, ferous, containing lead and sulphur; 4. Marmor metallicum, consisting of terra ponderosa saturated with the vitriolic acid, a substance insoluble in water; 5. A mixture of calcareous earth with the acid of fluor, forming a substance likewise insoluble in water; 6. Calcareous spar of different kinds, being calcareous earth saturated with fixed air, and something also which makes a variety: And, lastly, Siliceous substance, or quartz crystals. Unless, therefore, every one of these different substances were soluble in water, and crystallizable from it, we will look in vain for any explanation of these appearances by means of aqueous solution; while heat being capable of rendering all these substances fluid, they may be with the greatest simplicity transported from one place to another; and they may be made to concrete altogether at the same time, and differ only in place.

But what puts the matter beyond all doubt with our supposed author, is a specimen of ore taken from an Hungarian mine, and which contains petro-flex, pyrites, and cin-nabar, so mixed together and crystallized upon one another, that it is impossible to conceive any one of these bodies to have had its fluidity and concretion from a cause which had not effected the other two.

"Now (says our author), let those who would deny the fusion of this siliceous body explain how water could dissolve these three different bodies, and deposit them in their present shape. If, on the contrary, they have
have not the least shadow of reason for such a gratuitous supposition, the present argument must be admitted in its full force."

The next argument in favour of our author's doctrine is drawn from the existence of metallic bodies in their malleable state in the bowels of the earth. In this situation they are also commonly attended with such evident marks of fusion, that it is impossible to deny their having been really melted; and for the truth of this he appeals, among a thousand instances, to the great native mass of iron found by Dr Pallas in Siberia.

Oily or bituminous bodies are found variously intermixed with mineral substances, as well as forming distinct strata of themselves. Vegetables afford oily and resinous matters; which being collected at the bottom of the ocean are there formed into strata, afterwards changed by various degrees of heat, and the evaporation of their more fluid parts. "In order to understand this (says our author), it must be considered, that, while immersed in water, and under insuperable compression, the vegetable, oily, and resinous substances would appear to be unalterable by heat, and it is only in proportion as certain chemical separations take place, that those inflammable bodies are changed in their sub stance by the application of heat. Now, the most general change of this kind is by evaporation, or the distillation of their more volatile parts; by which oily substances become bituminous, and bituminous substances become coal. There is here a gradation, which is best understood by comparing the two extremes. On the one hand, we know by experiment, that oily and bituminous substances can be melted, and partly changed into vapour by heat; and that they become harder and denser in proportion as the more volatile parts have evaporated from them. On the other hand, coaly substances are deficient of fusibility and volatility, in proportion as they have been exposed to greater degrees of heat, and to other circumstances favourable to the dissipation of their more volatile and fluid parts. If, therefore, in mineral bodies we find the two extreme states of this combustible substance, and also the intermediate states, we must either conclude that this particular operation of heat has been thus actually employed in nature, or we must explain those appearances by some other means in as satisfactory a manner, and so as shall be consistent with other appearances. In this case it will avail nothing to have recourse to the false analogy of water dissolving and crystallizing salts, which has been so much employed for the explanation of other mineral appearances. The operation here in question is of a different nature, and necessarily requires both the powers of heat and proper conditions for evaporation. Therefore, in order to decide the point with regard to what is the power in nature, by which mineral bodies have become solid, we have only to find a bituminous substance in the most complete state of coal, intimately connected with some other substance which is more generally found con solidating the strata, and afflicting in the concretion of mineral substances. A most undoubted proof of this kind our author has in his possession, viz. a mass in which are blended together coal of the most fixed kind, quartz, and marmor metallicum. The specimen also is contained in a rock, which every naturalist, he says, will allow to have been produced by fire and fusion. The strata of fossil coal are found in almost every intermediate state, as well as in those of bitumen and charcoal. Of the former kind is that fossil coal which melts and becomes fluid by heat; of the latter, is that species found both in Wales and Scotland, which is perfectly in fusible in the fire, and burns like coals without flame or smoke. The former abounds in oily matter; the latter has been distilled by heat until it has become a corbus mortuus, or perfect coal. The more volatile parts of these bodies are sometimes found in their separate state. Thus at Raith in Fifethire, there is a stratum of limestone, which, though but slightly tinged with a black colour, contains bituminous matter like pitch, in many cavities which are lined with calcareous spar crystallized. Now, it is to be observed, that had the cavity in the solid limestone or marble, which is lined with calcareous crystals containing pyrites, been thus incrusted by means of filtration with water, this water must have dissolved calcareous spar, pyrites, and bitumen. But these natural appearances would not even be solved by this hypothesis of dissolution and filtration of these substances. There is also required, from the separation of these different substances from the aqueous menstruum. There is also required, from the separation of these different substances from the aqueous menstruum. There is also required, from the separation of these different substances from the aqueous menstruum. There is also required, from the separation of these different substances from the aqueous menstruum.

Proof that bituminous substances have been consolidated by heat

Formation of the different kinds of coal.
The Doctor now attempts to prove, from the appearance of the saline strata, that they have been formed by subterraneous heat and fusion as well as the others.

"The salt-rock in Cheshire lies in strata of red marl. It is horizontal in its direction, and is dug 30 or 40 feet deep. The body of this rock is perfectly solid, and the salt in many places pure, colourless, and transparent, breaking with a sparrey, cubical texture: but the greatest part is tinged by the admixture of the marl, and that in various degrees, from the lightest tinge of red to the most perfect opacity. Thus the rock appears as if it had been a mass of fluid, in which had been floating a quantity of marly substance not uniformly mixed, but every where separating and subsiding from the saline substance. There is also to be observed a certain regularity in the separation of the tinging from the colourless substance; which, at a proper distance, gives to the perpendicular section of the rock a distinguishable figure in its structure. When looking at this appearance near the bottom of the rock, it first presented the figure of regular stratification; but upon examining the whole mafs of rock, this stratification was found only to take place near the bottom. At the top of the rock, the most beautiful figure, though the most distant from stratification, was observed. It was all composed of concentric circles, and these appeared to be the section of a mass made up entirely of concentric spheres, like those beautiful systems of configuration which agitate so frequently present us with in miniature. In about eight or ten feet from the top, the circles growing larger, were blended together, and gradually lost their regular appearance, until at a greater depth they again assumed that of a regular stratification. This regular arrangement of the floating marly substance in the body of the salt, which is that of the structure of a coated pebble, or that of concentric spheres, is altogether inexplicable upon any other supposition than that the perfect fluidity or fusion of the salt, and the attractions and repulsions of the contained substances. It is in vain to look in the operations of solution and evaporation for that which nothing but perfect fluidity and fusion can explain.

"This example of a mineral salt congealed from a melted state, may be confirmed by another argument suggested by Dr. Black, viz. an alkaline salt found in a mineral slate, and described in the Philosoph. Transact. for 1771. The foilage alkali crystallizes from a disolved state, in combining itself with a large quantity of water, in the manner of alum: and in this case the water is essential to the constitution of that solid crystalline body; for, upon the evaporation of the water, the transparent salt loses its solidity, and becomes a white powder. If, instead of being gently dried, the crystalline salt is suddenly exposed to a sufficient degree of heat (that is, somewhat more than the heat of boiling water), it enters into the state of aqueous fusion, and boils, emitting the water by means of which it had been crystallized in the cold, and rendered fluid in that heated state. It cannot be crystallized from a dissolved state without the combination of that quantity of water; nor can that water be separated without destroying its crystalline state. But in this mineral specimen we have a solid crystalline salt, with a structure which, upon examination, appears to be sparrey and radiated like the zeolite. It contains no water in its crystallization, but melts in a sufficient heat without any aqueous fusion. Therefore this salt must have been in a fluid state of fusion immediately before its congelation and crystallization.

"Another example may be drawn from the iron-flone, which is commonly found among the argillaceous strata attendant upon foillie coal, both in Scotland and England. This flone is generally found among the bituminous schistus or black argillaceous strata, either in separate masses of various shapes and sizes, or forming of itself strata which are more or less continuous in their direction among the schistus or argillaceous beds. This mineral contains in general from 40 to 50 per cent. of iron, and it loses near one-third of its weight in calcination. Before calcination it is of a grey colour, is not penetrable by water, and takes a polish. In this state therefore it is perfectly solid; but being calcined, it becomes porous, red, and tender. The fact to be proved with regard to these iron flones is, that they have acquired their solid state from fusion, and not in concreting from any aqueous solution. A species of this kind of flone is found at Aberlady in Earl Lothian, resembling an oblate or much compressed sphere, and the size from two or three inches diameter to more than a foot. In the circular or horizontal section they present the most elegant septa: and from this examination of this particular strature, the following conclusions may be drawn.

"1. That the septa have been formed by the uniform contraction of the internal parts of the flone, to have received its volume of the central parts diminishing more than that of the circumference; by which means the separations of the flone diminish in a progression from the centre towards the circumference.

"2. There are only two ways in which the septa must have received the spar with which they are filled more or less; either, first, by infusion into the cavity of these septa after they were formed; or, secondly, by separation from the substance of the flone at the same time that the septa were forming.

"Were the former of these suppositions true, appearances would be observable, showing that the sparry substance of this flone had been admitted either through the porous structure of the flone, or through proper apertures communicating from without. Now, if either of these had been the case, and the flone had been congealed from no other cause than concretion from a dissolved state, that particular structure of the flone by means of which the spar had been admitted must appear at present upon an accurate examination. This, however, is not the case; and we might rest the argument here: The septa reach not the circumference; the surface of the flone is solid and uniform in every part; and there is not any appearance of the spar in the argillaceous earth around the flone. It therefore necessarily follows, that the contraction of the iron-flone, in order to form the septa, and the filling the cavities with spar, had proceeded pari passu, and that this operation must have been brought about by means of fusion or by congelation from a state of simple fluidity and expansion.

"There is one fact more, which is well worth our attention; viz. the crystallizations which are found in close
close cavities of the most solid bodies. These concretions are well known to naturalists, and form part of the beautiful specimens which are to be found in the cabinets of collectors, and which the German mineralists have named *drusen.* Our author, however, considers only one of these species, which is of the agate kind. It belongs to the kind of stones frequent in this country, which are commonly called *pebbles.* Many of them are filled with a siliceous crystallization, which evidently proceeds from the circumference towards the centre. Many of them again are hollow. They are uniformly lined with crystallized substances; and it is proper to attend to this circumstance, that the cavity is perfectly inclosed with many solid coats impervious to air or water; but particularly with the external cortical part, which is extremely hard, takes the highest polish, and is of the most perfect solidity, admitting nothing but the passage of light and heat.

"Within these cavities we had, first, the coats of crystals with which this cavity is always lined; and this is general to all substances concreted in similar circumstances from a state of fusion; for when thus at liberty they naturally crystallize. 2. We have frequently a subaqueous crystallization set upon the first, and more or less immersed in it. 3. There is also sometimes a third crystallization superimposed upon the second, in like manner as the second was upon the first. Our author has one specimen in which the primary crystals are siliceous; the second thin follicular crystals of deep red but transparent ore, forming elegant figures that have the form of roes; the tertiary crystallization is a frothing of small siliceous crystals upon the edges of the follicular crystals. In other specimens there is first a lining of colourless siliceous crystals, then another lining of amethystine crystals, and sometimes within that fuligineous crystals. Upon these fuligineous and amethystine crystals are many phremites or hemispheres of red compact iron-ore like haematites. In others again, the primary crystals are siliceous, and the second calcarceous. Of this kind there is one in the Doctor's possession, which has upon the calcarceous crystals beautiful transparent siliceous crystals, and iron phremites upon them. He has also an agate formed of various red and white coats, and beautifully figured. The cavity within the coated part of the pebble is filled up without vacuity; first with colourless siliceous crystals; secondly, with fuligineous crystals: and, thirdly, with white or colourless calcarceous spar. But between the spar and crystals there are many phremites, seemingly of iron, half sunk into each of these two different substances."

From the foregoing facts, our author now draws the following conclusions.

1. That concretion had proceeded from the surface of the agate inwards. This necessarily follows from the nature of these figured bodies, the figures of the external coats always determining the shape of those within, and never contrariwise, those within affecting those without.

2. That when the agate was formed, the cavity then contained every thing which is now found in it, and nothing more.

3. That the contained substances must have been in a fluid state, in order to their crystallizing.

4. That as this fluid state had not been the effect of solution in a crucible, it must have been fluidity from heat and fusion."

This is the substance of all the evidence brought by Dr. Hutton in support of his doctrine, that most of the mineral substances with which the strata are conjointly connected must have been produced by subterraneous heat, and not from any aqueous solution. Thus far he thinks it is perfectly conclusive, though not altogether for with regard to the formation of the strata themselves; but, in order to make it apply also to these, he next proposes to give examples of strata consolidated without the introduction of foreign matter, merely by the softening or fusion of their own materials.

For this purpose he considers the calcareous and siliceous strata, which are the two so much prevalent on the surface of the globe, that all others, according to him, may be considered as nothing: "for (says he) unless it be the bituminous or coal strata, there is hardly any other which does not contain more or less of one or other of these two substances. If, therefore, it can be shown, that both of these two general strata have been consolidated by the simple fusion of their substance, no deideratam or doubt will remain with regard to the nature of that operation which has been transfixed at great depths of the earth, places to which all access is denied to mortal eyes.

"We are now to prove, 1. That those strata have been consolidated by simple fusion; and, 2. That this operation is universal in relation to the strata of the earth, as having produced the various degrees of hardness or solidity in these bodies.

1. Condensation of a stratum from a fortuitous collection of hard bodies, such as gravel and sand, can only touch in points, and cannot while in that hard state be made to correspond so precisely to each other's shape as to consolidate the mafs. But if these hard substances should be softened in their substance, or brought into a certain degree of fusion, they might be adapted mutually to each other; and thus consolidate the open structure of the mafs. Therefore to prove the present point, we have but to exhibit specimens of siliceous and calcareous strata which have been evidently consolidated in this manner. Of the first kind great varieties occur in this country. They are the consolidated strata of gravel and sand, often containing abundance of feldspar, and thus graduating into granite; a body, in this respect, perfectly similar to the more regular strata which we now examine. The second kind again are leaves common, unless we consider the shells and coraline bodies of our limestones as exhibiting the same example, which indeed they do. But I have a specimen of marble from Spain which will afford the most satisfactory evidence of the fact in question. This Spanish marble may be considered as a species of puddingstone; a species of marble which, from Mr. Bowles's Natural History, appears to be very common in Spain. The gravel of which this marble is composed consists of fragments of other marbles of different kinds. Among these are different species of zeolites, marble, fome shell marbles, and some composed of a chalky substance, or of undistinguishable parts. But it appears that all these different marbles had been consolidated or made hard, then broken into fragments, rolled and worn by attrition; and thus collected together, along with some sand or small siliceous bodies, into
Earth.

into one mafs. Lastly, this compound body is consolidated in such a manner as to give the most distinct evidence that this had been executed by the heat of simple fusion.

"The proof is, that, besides the general conformation of those hard bodies, so as to be perfectly adapted to each other's shape, there is in some places a mutual indentation, which resembles perfectly the junction of the different beds of the cranium; and which must necessarily have required a mixture of those bodies while in a soft or fluid state.

"This appearance of indentation is by no means singular or limited to one particular specimen. I have several specimens of different marbles, in which fine examples of this species of mixture may be perceived. But in this particular case of the Spanish pudding-stone, where the mutual indentation is made, between two pieces of hard stone worn round by attrition, the softening or fusion of these two bodies is not simply rendered probable, but demonstrated.

"Having thus proved, that those strata had been consolidated by simple fusion, as proposed, we now proceed to infer, that this marble must not only be general but universal, in consolidating our earth in all the various degrees, from loose and incoherent shells and sand to the most solid bodies of the silicious and calcareous substances.

"To exemplify this in the various collections and mixtures of sands, gravels, shells, and corals, were endotics and superfine. We shall only take for an example one simple homogeneous body, in order to exhibit in the various degrees of consolidation, from the state of simple incoherent earth to that of the most solid marble. The substance meant is chalk, naturally a soft calcareous earth, but which may be found consolidated in every different degree.

"Through the middle of the site of Wight there runs a ridge of hills of indurated chalk. This ridge runs from the site of Wight directly west into Dorsetshire, and goes by Corfe Castle towards Dorchester, perhaps beyond that place. The sea has broken through this ridge at the west end of the site of Wight, where columns of the indurated chalk remain, called the Needle; the same being found on the opposite shore in Dorsetshire. In this field of chalk we find every gradation of this soft earthy substance to the most consolidated body of this indurated ridge, which is not solid marble, but which has lost its chalky property, and acquired a kind of flinty hardness.

"We have this cretaceous substance in its most indurated and consolidated state in the kingdom of Ireland, not far from the Giant's Causeway; and it affords the most perfect evidence of this body having been once a mafs of chalk, which is now a body of solid marble. Thus, if it is by means of fusion that the strata of the earth have in many places been consolidated, we must conclude that all the degrees of consolidation, which are indefinite, have been brought about by the same means.

"It may, however, still be alleged, that there is a great part of the solid mafs of this earth not properly comprehended among those bodies which have been thus consolidated by means of fusion. This is granite; a mafs which is not generally stratified, and which being a body perfectly solid, and forming some parts in the structure of this earth, deserves to be considered. The nature of the granite is too intricate a subject to be here considered; we shall therefore only now take notice of one species; and if this appears to have been once in a state of fusion, we must conclude that all the rest have been so too. The species in question comes from Portfandy, on the road to Huntley; and is partly a porphyry and partly a granite. The singularity of it, however, consists not in the nature or proportions of its constituent parts, but in the uniformity of the sparriy ground, and the regular shape of the quartz mixture. This silicious substance, viewed in one direction, or longitudinally, may be considered as columnar, prismatic, or continued in lines running nearly parallel. These columnar bodies of quartz are beautifully impressed with a figure on the sides, where they are in contact with the spar. This figure is that of furrows or channels, which are perfectly parallel, and run across the longitudinal direction of the quartz. This striated figure is only seen when, by fracture, the quartz is separated from the contiguous spar. But what is more particularly to be noted is, that the transverse section of those longitudinal bodies not only have figures of the forms of certain typographical characters, but collectively give the regular linear appearance of types set in writing.

"It is evident from the inspection of this fossil, that the sparriy and silicious substances had been mixed together in a fluid state; and that the crystallization of the sparriy substance, which had been rhombic, had determined the regular structure of the quartz, at least in some directions. Thus the silicious substance is to be considered as included in the spar, and as figured according to the laws of crystallization proper to the sparriy ground; but the spar is also to be found included in the quartz. Now it is not possible to conceive any other way in which these two substances, quartz and feldspar, could be thus concreted, except by congelation from a fluid state, in which they had been mixed."

Our author having at length finished his arguments on the formation of the strata, draws the following general conclusion. "If it be by means of heat and fusion Veins of that strata have been consolidated, then, in proportion the strata are brought to the degree of consolidation they have undergone from their original state, they should, ceteris paribus, abound with more separations in their masts. But this conclusion is not found consistent with appearances. A fragment of sand-stone does not abound so much with cutters or veins as a similar fragment of marble, or even a similar fragment of sand-stone that is more consolidated. In proportion therefore as strata have been consolidated they are in general interfused with veins and cutters; and in proportion as strata are deep in their perpendicular section, the veins are wide, and placed at greater distances. In like manner, when strata are thin, the veins are many; but proportionally-narrow.

"It is thus upon chemical principles to be demonstrated, that all the solid strata of the globe have been condensed by means of heat and hardened from the fluid state of fusion. But this proposition is equally to be esteemed from propositions that are mechanical. The strata of the globe, besides being formed of earths, are composed of gravel, sand, and fragments of hard bo-

ières;
Earth.

The Earth.

71. Could not be consolidated by a fluid solution.

72. Must have undergone a fusion by fire.

73. How the strata have been elevated from the bottom of the ocean.

74. The formation of the strata is supposed to be fully discussed; after which our author goes on to consider the means by which they have been elevated from the bottom of the ocean; for he looks upon it as an undoubted fact, that the highest points of our land have been for ages at the bottom of the ocean. "It is a truth unquestionable (says he), that what had been originally at the bottom of the sea, is at present the highest part of our land. In explaining this appearance therefore no other alternative is left, but either to suppose the strata elevated by the power of heat above the level of the present sea, or the surface of the ocean reduced many miles below the height at which it had subsided during the collection and induration of the land which we inhabit. Now if, on the one hand, we are to suppose no general power of subterraneous fire or heat, we leave our theory no means for the retreat of the sea or the lowering of its surface. If, on the other, we are to allow the general power of subterraneous heat, we cannot have much difficulty in supposing either the surface of the sea to have subsided, or the bottom of the ocean in certain parts to have been raised by a subterranean power above the level of its surface, according as appearances shall be found to require the one or the other of these conclusions. "

75. Nature of each other so far as concerns the materials of which they are formed; but there cannot be any sudden change, fracture, or displacement naturally in the body of the stratum. But if these strata are cemented by the heat of fusion, and erected with an expansive force acting below, we may expect to find every species of fracture, dislocation, and distortion in those bodies, and every degree of departure from a horizontal towards a vertical position. The strata of the globe are actually found in every possible position; for from horizontal, they are frequently found vertical; from continuous, they are broken and separated in every possible direction; and from a plane, they are bent and doubled. It is impossible they could have been formed by the known laws of nature in their present state and position. And here the apparent irregularity and disorder of the mineral regions are as instructive, with regard to what had been transacted in a former period of time, as the order and regularity of these fame regions are conclusive in relation to the place in which a former state of things had produced that which in its changed state, we now perceive.

76. We are now to conclude, that the land on which we dwell had been elevated from a lower situation by raised by the same agent which had been employed in consolidating the strata, in giving them stability, and preparing them for the purpose of the living world. This agent is matter actuated by extreme heat, and expanded with amazing force. If this has been the case, it will be reasonable to expect that some of the expanded matter might be found condensed in the bodies which have been heated by that igneous vapour, and that matter foreign to the strata may have been thus introduced into the fractures and separations of those indurated masses. We have but to open our eyes to be convinced of this truth. Look into the sources of the mineral treasures; ask the miner from whence has come the metal into his vein? Not from the earth of air above, not from the strata which the vein traverses. There is but one place from whence these minerals may have come; and that is, the bowels of the earth; the place of power and expansion; the place from whence must have proceeded that intense heat by which loose materials have been consolidated into rocks, as well as to that enormous force by which the regular strata have been broken and displaced.

77. We are of opinion, that this action of heat is a great and likely to be evident from an inspection of the materials with which the veins are filled, as well as their various power requisite to fill the veins with the matter they contain. Successive irruptions of fluid substances into the veins, he says, is demonstrable from the mere inspection of the veins and their contents, it being very common to see three successive series of these operations; all which may be perceived in a small fragment of stone, which a man of science may examine in his closet, often better than by descending to the mine where all the examples are found on a large scale.

These fiery operations, he contends, are not to be accounted any way accidental, but as entirely natural to the globe, and remain at this day with undiminished force: and of this he brings a proof from the eruptions...
tions of mount Etna, informing us, that he has in his possession a table of Sicilian Jasper, which evidently shows that this calcareous stone had flowed and been placed in such a state of fusion as lava is.

This subterraneous heat manifested in the burning mountains is the renovating power which the earth possesses within itself, and which prevents it from coming to an end by reason of the perpetual waste taken notice of.* 22. “Volcanoes (says he) are natural to the globe as general operations; but we are not to consider nature as having a burning mountain for an end in her intention, or as a principal purpose in the general system of this world. The end of nature in placing an interior fire or power of heat, and a force of irresistible expansion in the body of this earth, is to consolidate the sediment collected at the bottom of the sea, and to form thereof a mass of permanent land above the level of the ocean, for the purpose of maintaining plants and animals. The power appointed for this purpose is, as on all other occasions where the operation is important, and where there is any danger of a shortcoming, wisely provided in abundance; and there are contrived means for disposing of the redundancy. Thence, in the present cafe, are our volcanoes.

“A volcano is not made on purpose to frighten superflitious people into fits of piety and devotion, nor to overwhelm devoted cities with destruction. A volcano should be considered a spire to the subterraneous furnace, in order to prevent the unnecessary elevation of land and fatal effects of earthquakes; and we may rest assured, that they in general wisely answer the end of their intention, without being in themselves an end for which nature had exerted such amazing power and contrivance.”

The Doctor then goes on to show, that volcanoes are not proper for elevating land, unless, placed at the bottom of the sea, where the contact of the water tends to close the orifice, and to accumulate matter upon the weakest part. An instance of this was given in the year 1707, when the burning cloud arose in the Mediterranean; and he confirms his theory by the great number of melted matters which are every where to be found in the strata, even of countries where no volcanoes exist at present. Examples are brought from the dykes of whin-flone, as they are called in this country, and which he supposes to have been once in a state of fusion.

In order to avoid an objection which might here arise from the difference betwixt the appearance of our whinflone and the lavas of volcanoes, our author makes a distinction between such as have been erupted at the moment of explosion, and those which had been melted under a vast compriison of weighty materials, and at last exposed to the air after the lapse of a number of ages. “In the erupted lavas, those substances which are subject to calcine and vitrify in our fires, suffer similar changes when delivered from a compriison which had rendered them fixed, though in an extremely heated state. Thus a lava in which there is much calcareous spar, when it comes to be exposed to the atmosphere, or delivered from the compriison force of its confinement, effervesces by the explosion of its fixed air; the calcareous earth at the same time vitrifying with the other substances. Hence such violent ebullition in volcanoes, and hence the e-
million of so much pumice stone and ashes which are of the same nature. In the body of our whinflone, on the contrary, there is no mark of calcination or vitrification. We frequently find in it much calcareous spar, or the terra calcarea aerata, which had been in a melted state by heat, and had been crystallized by congelation into a sparry form. This is the cause of the differences between the erupted lavas and our whinflone, toadflone and the Swedish trap; which may be called subterraneous lavas.”

All this time our author seems to have excluded from his system every idea of accounting for the origin of metals, though this would seem to be no less necessary than to account for that of whin-flone. At Strange, however, we are informed that there are peculiar productions in the mineral kingdom which are rare, as being found only in few places; and of these he enumerates the diamond of this subterraneous heat, the perlite, or terra calcarea aerata, which had been in a melted state by heat, and had been crystallized by congelation into a sparry form. This is the cause of the differences between the erupted lavas and our whin-flone, toadflone and the Swedish trap; which may be called subterraneous lavas.”

The last part of our author’s dissertation contains a system of the fystem of decay and renovation observed in the earth. In this having again observed what had been renovation already repeated over and over, that the land we now see at present had been formed at the bottom of the sea, he proceeds to inform us, that, “at a grofs computation, there may perhaps be a fourth part of our present earth which is composed from the matter that had land belonged to these animals. Now what a multitude of people are not found in the present state of the earth, have been required, for producing a body of calcareous matter which is interferrerfed throughout all the land of the globe, and which certainly forms a very considerable part of the mafs! Therefore, in knowing how these animals had lived, or with what they had been fed, we shall have learned a moit interesting part of the history of the earth, a part which it is necessa-

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Earth.

Conjectures concerning the former earth.

Earth.

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"No perpetual progress made in the dissolution of this earth.

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Having thus described very particularly the means by which the destruction of the present earth is going on, it is natural to inquire what progress has been made in the work. But in this neither ancient nor modern history give any assistance. The strait between Italy and Sicily he confesses to be no wider; the isthmus of Corinth to be no narrower; nor the rock on which the famous tower of Pharos was erected, either larger or smaller than before. The Palus Maeotis in the time of Polybius appeared to be very near filling up, as that historian informs us; and so it continues to appear at this day, without any apparent progress having been made in it. In short, the whole of our author's researches can produce nothing more than the loss of a small island in the mouth of the harbour of New Carthage, which, Polybiustays, existed in his time; and for which there is now only a rock under water. Our author therefore is obliged at last to own, that the quantity of decay in the rocks he speaks of, has either been too small for human observation, or, which is more probable, that no accurate measurement of the subject by which this quantity of decrease might be ascertained had been taken and recorded. "

To sum up the argument, therefore (says he), we are certain, that all the coasts of the present continents are washed by the sea, and constantly wearing away upon the whole; but this operation is so extremely slow, that we cannot find a measure of the quantity in order to form an estimate. Therefore the present continents of the earth, which we consider as in a state of perfection, would, in the natural operations of the globe, require a space indefinite for their destruction. But in order to produce the present continents, the destruction of a former vegetable world was necessary; consequently the production of our present continents must have required a time which is indefinite. In like manner if the former continents were of the same nature with the present, it must have required another space of time, which is also indefinite, before they had come to their perfection as a vegetable world.

It is necessary, however, that the present land would be worn away and washed exactly in proportion as new land shall appear; or conversely, that an equal proportion of new land should always be produced as the old is made to disappear. It is only required, that at all times there should be a just proportion of land and water upon the surface of the globe, for the purpose of a habitable world. Neither is required, in the actual sytem of this earth, that every part of the land should be dissolved in its structure, and worn away by attrition, so as to be floated in the sea. Parts of the land may often sink in a body below the level of the sea, and parts again may be reformed, without waiting for the general circulation of land and water; which proceeds with all the certainty of nature, but which advances with an imperceptible progression. Many such apparent irregularities may appear without the least infringement on the general sytem. That sytem is comprehended in the preparation of future land at the bottom of the ocean, from those materials which the dissolution and attrition of the present land may have provided, and from those which the natural operations of the sea afford.

We have been now supposing, that the beginning of our present earth had been laid in the bottom of the ocean at the completion of the former land: but this was only for the sake of distinctions. The just view is this, that when the former land of this globe had been complete, so as to begin to waste and be impaired by the encroachment of the sea, the present land began to appear above the surface of the ocean. In this manner we suppose a due proportion of land and water to be always preserved upon the surface of the globe for the purpose of a habitable world, such as we possefs. We thus allow time and opportunity for the translation of animals and plants to occupy the earth. But if the earth on which we live began to appear on the ocean at the time when the last began to be removed, it could not be from the ma-
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Materials of the continent immediately preceding this which we examine, that the present earth had been constructed: for the bottom of the ocean must have been filled with materials before land could be made to appear above its surface. Let us suppose, that the continent which is to succeed our land is at present beginning to appear above the water in the middle of the Pacific Ocean; it must be evident, that the materials of this great body, which is formed, and ready to be brought forth, must have been collected from the destruction of Earth from which does not now appear. Consequent in this true statement of the cave, there is necessarily required the destruction of an animal and vegetable earth prior to the former land; and the materials of that earth which is first in our account, must have been collected at the bottom of the ocean, and begun to be concocted for the production of the present earth, when the land immediately preceding the present had arrived at its full perfection. This, however, alters nothing with regard to the nature of those operations of the globe; the system is still the same. It only protracts the indefinite space of time in its existence, while it gives us a view of another distinct period of the living world; that is to say, the world which we inhabit is composed of the materials, not of that which was the immediate predecessor of the present, but of the earth which, in ascending from the present, we consider as the third, and which had preceded the land that was above the surface of the sea while our present land was yet beneath the water of the ocean. Here are three distinct successive periods of existence; and each of them is, in our measurement of time, a thing of indefinite duration. We have now got to the end of our reasoning; we have no data further to conclude immediately from that which actually is; but we have got enough. If the succession of worlds is established in the system of nature, it is in vain to look for anything higher in the origin of the earth. The result therefore of our present inquiry is, that we find no vestige of a beginning, no prospect of an end."

VI. Though the theory of which we have now given such a large abstract is the most laboured and complete that hath yet appeared, it is still necessary to take notice of some other attempts, though perhaps less calculated to draw the attention of the public than that of Dr Hurton. One of these is by Mr Whitehurst; of which the following is the most material part of an abstract given by himself at the end of his work.

"1. The globe we now inhabit was originally in a state of fluidity; and that not owing to any divino principle or sufluent solvity, but to the first assemblage of its component parts. Whence it is presumed, that the earth had a beginning, and has not existed from eternity, as some have imagined; though the precise number of ages it has existed have not yet been actually determined."

The proof given by our author of this original fluidity of the earth rests entirely upon its oblate spheroidal form; which a fluid globe may easily be supposed to assume, though we cannot conceive how a solid one should do so.

2. "The fluidity of the earth, and the infinite divisibility of matter, evidently show, that the component parts of air, earth, water, &c. were uniformly blended together, none being heavier or lighter than another; whereby they composèd an uniform mass or pulp, of equal consistence in every part, from its surface to its centre; consequently the new formed globe was unfit for animal or vegetable life; and therefore it would seem extremely absurd to suppose that either the one or the other were created during the chaotic state of the earth, or prior to its being formed into an habitable world: therefore the presumption is great, that mankind were created till the earth was become suitable to the nature of their existence."

The proof of this position is laid down in the following manner. "It is a truth universally known, that the component parts of the most dense bodies become fuspeded in whatever manner they are dissolved: as metals in acids, 

3. "The component parts of the chaos were heterogeneous, or endowed with peculiar laws of attraction; whereby similar bodies are disposed to unite and form select bodies of various denominations, as air, water, earth, &c.: by means of these principles the chaos was progressively formed into an habitable world.

"But the first operation which presents itself to our consideration is the oblate spheroidal figure of the earth, acquired from its diurnal rotation, and the laws of gravity, fluidity, and centrifugal force: which was no sooner completed, than the component parts began to act more freely, according to their affinities: hence the particles of air united to those of air, those of water to water, and those of earth to earth; and with their union commenced their specific gravities, and destroyed that uniform suspension which had hitherto prevailed throughout the chaotic mass. Thus commenced the separation of the component parts; for those of the greatest density began their approach toward the centre of gravity; and those of the greatest levity ascended towards the surface: therefore, as air is nearly 800 times lighter than water, the presumption is great, that the former was sooner freed from the general mass than the latter, and formed a kind of muddy impure atmosphere, surrounding the newly formed globe. —Water, being next in levity, succeeded the air, and as it ascended covered the earth in one vast ocean. In process of time these elements became perfectly pure and fit for animal life.

4. "The component parts of the chaos being thus progressively separated and formed into select bodies, formed by the attraction of the sun and moon, the solid parts could not uniformly subside from every part of the surface, and become equally covered by water; for as the separation of the solids and fluids increased, the tides increased, and removed the former from place to place without any order or regularity. Hence the sea became unequally deep; and these inequalities daily increasing, in process of time dry land appeared, and divided the waters which had, hither..."
Several days must have elapsed before the sun became visible.

5. "Such appears to have been the natural order and progression of these things; consequently, as the sun was coeval with the earth, several days and nights must have preceded the sun's first appearance in the heaven's, or its becoming visible on the fourth day, according to the scripture account.

6. "The atmosphere, sea, and land, being thus formed for the reception of the animal and vegetable kingdoms in successive periods of time, we have now to consider the order in which they were severally created. First, since it appears that the ocean became perfectly pure and fit for animal life before the primitive islands were formed, therefore we have endeavoured to prove from a series of undeniable facts (a), that marine animals were first formed; and being extremely prolific, they increased and multiplied so exceedingly as to replenish the sea from pole to pole. The ocean being thus flocked with inhabitants prior to the formation of the primitive islands, many of them became enveloped and buried in the muck by the continual action of the tides; particularly all the species of shell-fish, which are least able to defend themselves from such interments. Therefore, since the remains of marine animals are imbedded at various depths in the earth, from one to that of several thousand feet, and this in all parts of the world hitherto explored, they bear sufficient testimony, that these marine bodies were thus entombed at successive periods of time; and likewise that they were created prior to the primitive islands, and consequently prior to any terrestrial animals. It may be needfuls further to observe, that these beds of marine shells plainly evince, that they were generated, lived, and died in the very beds wherein they are found, and were not brought from distant regions by a flood or floods of water, as some people have suppos'd; consequently such beds were originally the bottom of the ocean.

7. With regard to the mountains, and indeed the continents also, Mr Whitehurst is of opinion, that they are the effects of subterraneous fire. His sentiments on this subject, however, are something singular; for he tells us, that "mountains and continents were not primary productions of nature, but of a very distant period of time from the creation of the world, when the earth had acquired their greatest degree of firmness and cohesion, and the telifaceous matter had affirmed a fomy hardness." Thus we have given a very particular account of all the theories of any note concerning the formation of the earth which have yet made their appearance. The deficiency of those of Burnet, Woodward, Whitfon, and Buffon, must be exceedingly obvious even to the most superficial reader. They all assume only the powers of attraction and repulsion as agents; without considering that these two powers, or indeed any other two with which we are acquainted, could only have composed matters nearly similar to each other. If the original particles of matter are homogeneous, and endowed with similar powers, all the matter we observe ought to be homogeneous also. But this is far from being the case. Some parts of it we see are exceedingly hard, others proportionally soft. The parts of some bodies attract each other violently; those of others have hardly any attraction for each other, but are separable by the smallest force. And though it should be granted that the powers of attraction and repulsion were originally different in different parts of matter, we have still to explain by what means the similar parts of matter found out each other in such a chaos as the earth originally was. This seems an insuperable difficulty in the systems of Drs Burnet and Woodward; and is equally, though less, complicated in those of Whitfon and Buffon.

Mr Whitfon's system has another and very remarkable defect. He supposes the earth to have been originally a planet, and at a certain time to have become a world: but he forgets to tell us by what means this comet was originally formed, or what kind of bodies the comets are. Yet certainly this theory of the comet must be necessary to his system as the theory of the earth itself: for all the substances now existing on the earth must originally have existed in the comets; and if the natural powers were known which made a distinction between one substance and another in the comet, we would also know those which distinguished terrestrial substances from one another. But though even this great deficiency should be overlooked, the supposition of a chaos or original confusion of any kind involves us in the greatest difficulties. If the whole surface of the earth consisted of a chaos or melted matter, we cannot reasonably think it would have appeared otherwise when cool, than the laves of burning mountains do just now; and this is a consequence of his system which Mr Whitfon seems to have entirely overlooked.

Mr Buffon's theory is liable to the same difficulties. He placed his chaos in the sun; and therefore ought to have given a theory of the sun before he gave one of the earth. It ought also to have been shown for what purpose the sun was created when he had nothing to shine upon, or what probability there is that comets existed when there were no planets. His account of the formation of the planets by the stroke of a comet, is just within the verge of possibility; but his account of the formation of mountains by the motion of the winds and tides, is certainly inconsistent with the common principles of mechanics. Though it should be granted, that water can dissolve every terrestrial substance when vitrified by a heat 10,000 times greater than our hottest furnaces, as the sun must necessarily be; and though the water should let fall this matter as a sediment in what quantities and forms we think proper to imagine; it is impossible any of it could be thrown two or three miles above the surface of the water, in order to form those high mountains which are to be met with in different parts of the world. It is indeed very plain, that though by the motion of the waters their sediment might be collected in great heaps, it could never reach higher than their surface. The mountain,
mountain, once formed, must then be for ever covered with water; for the sediment would take up precisely the same bulk when a mountain that it did when in a state of dissolution, and the water could never retire from it as he supposes. If the waters retired into vast subterraneous caverns, according to another of Mr Buffon's suppositions, they must have remained for ever in those caverns, from whence they could not have reappeared to effect those wonderful changes he describes to them. But what is the strongest manner shows the fallacy of Mr Buffon's hypothesis, is the analogy he draws between mountains on dry land and islands in the sea. The islands, he says, are only the tops of great mountains in the ocean. If, therefore, the ocean had for a series of many ages covered the present habitable part of the world, as our author supposes, we should undoubtedly find many mountains upon the dry land, the tops of which had formerly been islands. But no such thing is to be found. There is not on earth a great mountain or Ireland, or even like islands of such extent as that of Great Britain or Ireland, or even like islands of much less consideration.

Thee, and many other objections that will naturally occur to an attentive reader, shew the extreme difficulties under which the hypothesis of Mr Buffon labours, as well as others. These difficulties arise, in the first place, from their assuming too few natural powers. Though it is certain that the powers of attraction and repulsion exist in nature, it is no less certain that there are many others. One very remarkable power entirely different from those of attraction and repulsion may be called the power of assimilation or transformation. By this, each animal, and each plant, changes the nutritious particles thrown into its stomach, or which it meets with in the earth, into a substance of its own peculiar kind. Thus, a stalk of wheat, by means of its roots, always assimilates the nutritious particles of the ground into that particular grain we call wheat, and no other. This power naturalists have not been able to explain on the principles of attraction and repulsion, or any other with which we are acquainted; and therefore it may justly be called one of the primary laws of this earth at least, whether we understand the manner in which it operates or not.

Another power which seems to be diffused throughout this terraqueous globe, and common to all substances, water alone excepted, is that of multiplying themselves, or producing others of the same species. With regard to plants and animals, that is exceedingly evident; but may be disputed in the case of minerals. It is certain, however, that those mines which have been exhausted, will in time be again replenished with ore; that spars and crystalls, if broken or cut while their connection with the earth remains, will produce a substance similar to the ref; as certainly as the wounded body of an animal will produce flesh of a kind similar to what was taken away. The earth itself is capable of this multiplication. We see how it hath a tendency to ascend, and cover ftones, &c. which lie a long time on its surface; and thus does this element, seemingly the most sluggish of all others, swallow up every thing that lies for some time undisturbed upon it. Hence we now meet with many monuments of antiquity below ground, which formerly were undoubtedly above it. Yet we have no right from thence to conclude, that the height of the dry land above the water was greater at that time than what it is now. This multiplication of earth is chiefly owing to vegetation; which continually produces a new crust on the top, and thus tends to bury all such matters as rest upon the surface. This crust, however, does not produce a continual increase in the height of the dry land; for whatever quantity the vegetables add to the surface, they take from the under parts by the friction of their roots. Thus the ground becomes more porous, and the weight of ancient buildings, ftones, &c. gradually forcing them downwards, they are at last buried under ground to a considerable depth.

Hence it is easy to account for the sinking of the marine bodies that are to be found at different depths in the earth, even supposing them to have been left on its surface by the deluge. M. Buffon's objection, drawn from the great quantities of them, seems but very weak: for it is certain, that marine animals, both of the crustaceous and other kinds, are found in the sea at this day in amazing quantities; and there is no bed of ftones so large, that we can reasonably think it impossible for all the animals to have existed in it at once.

With regard to the strata, it seems undeniable that they may be produced from natural causes. Clay will sometimes be consolidated into ftones; flint, marble, and limestone, are all found to grow naturally in the surface of the earth; so that we cannot draw any conclusion from the strata in which we now find them. Though we find a bed of ftones, then, in the heart of a solid rock, this makes no difficulty in the theory of the earth; since we know that the rock hath by some natural cause been consolidated around them. In fact, this is not so wonderful, as what is related by Mr Price in his Treatise of Minerals, Mines, &c. viz. That at the town of Redruth in Cornwall, "some labourers being put to clear and level the street for a pavement, they found a piece of hard ftone in the ground, with abundance of common small pins of brass interperfed in and throughout the ftones, in such manner and form, that all those who saw it afterwards were convinced it was not done artificially, but that the ftones were formed and produced by petrifaction, subseuent to the time the pins were dropped into the ground." Doctor Plot, in his Natural History of Staffordshire, says, that near Newcastle under Lyne, there was found a ftone with a man's skull, teeth and all, inclosed in it."—From these and other facts in some measure familiar, this author concludes, that every earth or clay, in some places, may be converted into ftones in process of time, at such a depth where it is undisturbed by being never lacerated nor molested, and also where it abounds with an uncommon quantity of juices of a lapidifcent quality; but this property being extenuated or destroyed, the earthy ftones may not improbably again return to their primitive clay. Thus we see fomes ftones, when dug out of the ground and exposed to the air for a considerable time, do moulder again into earth, at least in appearance; while others, of an earth-like quality, are indurated, and become more compact and durable by lying above ground.

The theory laid down by Dr Hutton is of a different nature from the rest; and as it has been supposed to be directly to mitigate against revelation, merits a particular consideration. The expression, however, which
which he concludes his dissertation, that "we can find no vestige of a beginning—no prospect of an end," might be supposed to relate only to the deficiency of our understandings or mode of inquiry, had he throughout the whole course of his work given a single hint of any materials from which the world was originally formed. In this he differs most essentially from the other theorists whom we have mentioned; for all of them suppose a chaos to have been originally created, from whence all the variety of substances we see at present have been formed. But as the Doctor makes no mention of anything prior to a world nearly similar to what we see at present, we must necessarily conclude that its eternity is a part of his creed. Now, that the world has not been eternal, may be proved from what he himself allows. Wherever we perceive a succession, we know that there must of necessity have been a beginning: but, according to our author, there has been a succession of worlds, by a kind of uncouth generation, similar to what would happen to the human race, if a man was to descend immediately from his grandmother. Proceeding in this way, therefore, we must at last arrive at one great-grandmother of earths, from where all the rest were descended; and of this one a theory was no less necessary than of any of her successors. This theory would have been the more difficult, as his great element cockle-shells and oysters would then have been absent, and the materials from whence they were afterwards to be produced must have been fought for.

Another argument, which evidently shows not only that the world is not eternal, but that some other power besides its own interfered with it originally, may be taken from the existence of animals and vegetables; both of which our author allows to have had a place throughout all his worlds. We see at present, that animals proceed from animals, and vegetables from vegetables; but the time must have been, when an animal was produced without a parent, and a vegetable without a seed. At this time the world must have been influenced by a power different from any it possesses at present; for no such power is now to be found in any part of the globe.

Lastly, the quantity of shells, great as it is, can by no means be reconciled with an eternal succession of worlds, or even with three; for, according to him, we must have three in order to have two habitable ones; viz. one lying at the bottom of the sea, another wearing away, and another beginning to emerge. Now he informs us, that only a fourth part of our land is composed of calcareous matter derived from marine animals; but if one of the worlds has continued for a time indefinite, and consequently another lain at the bottom of the sea for an equal length of time, it must, instead of having a fourth part of its soil composed of calcareous matter at the time of its emergence, have been entirely composed of it, at least if we can credit what is said concerning the prolific nature of these animals. Mr. Whitehurst informs us, that "it is not uncommon to take away a bed of shell-fish several fathoms in thickness; and though the places where they are filled appear to be entirely exhausted, yet in the ensuing year there shall be as many found in all these places as before." Such an amazing increase must, in a time indefinite, especially if repeated for an indefinite number of times, have reduced the whole terraqueous globe to an heap of cockle-shells or other substances of that kind.

Our author is equally unfortunate in the very first step of his argument, where he says that the soil must have been formed from the destruction of the old world. He owns that all his earths, produced vegetables; but these must have had a soil wherein to grow before the first world had time to be destroyed. We are therefore here in the same dilemma with regard to the soil that we were before. The considerations above linguistic may be observed concerning the prolific matter which describes the Earth. For we have already seen that the earth has been formed from various materials; and as we are obliged to own the interference of a Superior Power to produce the first vegetable, so must we also have recourse to the same power for the production of the soil on which it grew. All these considerations ought to have led the Doctor to a conclusion very different from that which he has drawn, and to have showed him the beginning of the world was occasioned by a power which cannot possibly be investigated, because it lies without the bounds of Nature itself, and far beyond the reach of our faculties.

This objection indeed militates invincibly against all theories of the earth which seek to derive its original from natural causes. The powers of attraction and repulsion we have already shown to be insufficient; and though we should add to them those of fire and water with all the train of solvents and precipitates which chemistry can afford, the deficiency will still be as great. It is true, that by means of chemistry we can imitate many of the natural operations, provided we have the proper materials: But this is the capital defect in all our theories of the earth. Whence came vast quantities of argillaceous earth into one place, of silicious earth into another, of the materials for iron, silver, gold, &c. into the places where they are now found? With Dr Hutton indeed the whole seems to be composed of two materials, viz. calcareous earth and flint. But before he could justify this assertion, he ought to have produced from these two materials, at least a great number of the different substances with which the earth is replenished. But instead of this, he has recourse to natural productions, formed, as he says, by means which, in the hands of the best chemists, will prove insufficient to produce anything like them.

In his account of the origin of calcareous matter, he tells us, it is to be derived entirely from the shells of marine animals; but he forgets to inform us whence these animals got their shells. There must have been some source of calcareous matter from which the first oyster (for we have already seen that they could not have existed from eternity) derived its shell, and that independent of any other marine animal. Now we see at this day an abundant source from whence the shells of all marine animals may be derived, viz. the waters of the ocean, which contain a great quantity of calcareous matter. If we inquire whence these waters have it, we may say they take it up from the earth, part with it again in the form of shells, corals, &c. redissolve it, and so on. But if we will still inquire farther whence the earth itself had it, we must once more have recourse to that unsearchable and supernatural power to which we ascribed the origin of animals, vegetables, and the foil on which they grow.

It is the foundation of Dr Hutton's theory, and indeed
I will try to explain that, so far as we can, the doctrine of most theologists, that the earth we inhabit has once been at the bottom of the sea; and it is thought to be a sufficient proof of this, that such vast quantities of marine shells are to be met with on dry land. Mr Whitehurst, after giving a long account of these shells, infers, among other things, that the “beds of fossil shells, which consist of one species only, and are not natives of the climate where found, but of very distant regions of the earth, evidently show that they were generated, and have lived and died in the very beds where found; and could not have been removed from their native climates by a flood or floods of water, with so much order as to form beds consisting only of one select species; and therefore all such beds must have been originally the bottom of the ocean.”

On this mode of reasoning, however, we must observe, that no hypothesis can have a worse foundation than when it is built confessedly on our own ignorance. We know not, for instance, how a bed of fossil shells came into a certain place; therefore the whole world has been at the bottom of the sea for many thousand years, the climates have changed, or it has been eternal! Thus to unhinge the settled laws of nature for such trivial purposes, is certainly the greatest contradiction to true reasoning that can be imagined. But it is not only from a negative argument of this kind that we may refute this hypothesis; there is a much stronger one drawn from the marine productions themselves. It is certain, that there are substances very different from shells of any kind, which grow up from the bottom of the ocean, and in time indefinitely ascend all the way to the surface, and there form islands. These are the coral rocks so common and so dangerous in the South Sea, and of which many of the islands there are formed. Now, how comes it to pass, that among all the marine monuments to be found on land, we find no coral rocks growing there? The answer to this is obvious. The coral rocks require a vast length of time for their production, and are strongly fixed to the place where they grow; they cannot therefore be removed over land by any sudden flood or inundation, not even by a general deluge. Though it appears therefore, from the shells and other marine moveables, that what is now dry land has once been at the bottom of the sea, yet it is equally evident from the deficiency of these rocks, that it has not remained so for any length of time; and therefore, though we should by no means be able to explain all the appearances of fossil shells, we are not to admit a supposition which, from the circumstance just mentioned, cannot possibly be true.

With regard to these shells, however, we must remark, that it is in vain to attempt the explanation of every appearance; nor can any such thing be reasonably defined, even though we should acknowledge the deluge to be the universal caufe. We know not, nor can we have any conception of, what might be accomplished by the mere mechanical motion of the waters in this case. Every one who has had an opportunity of seeing the effects of a violent land-flood, will be ready to own that it has performed things which a priori he would not have thought it capable of doing. But how infinitely must these effects be exceeded by one vast deluge, in which only the dry land was oftened by an incessant rain of six weeks, but the sea rose on all sides, and poured in upon it with all the movable contents which the waters carried along with them?

That great numbers of shells already formed would be brought along with the waters of the ocean, is an assertion which can scarcely be denied; and we shall be inclined to look upon this number as exceedingly great, if we consider the way in which it is most probable that the deluge came on. This was by the filling out of waters from every pore of the earth and bottom of the sea, as well as by their descent from the clouds. In this mode of reasoning, however, we must observe, that the earth we inhabit has not remained so for a much longer time than by the former supposed, as far as we can judge from the deficiency of the shells and other marine productions on land. It is evident, that what is now dry land was once been at the sea-coasts, and therefore the whole world’s surface must have been inundated at least one year.

The continuance of the flood allowed time for shell-fish to breed on land. Numbers of shells which the earth would be submerged, several other shells must be taken into consideration. One is, that the earth, by the continual rains at the time of the deluge, as well as by the gradual rise of the sea, where through its substance, must have been exceedingly soft and easily penetrated. The helpless animals, therefore, water.
therefore, brought along with the ocean at its first irruption over land, would have been deep buried in the mud: and when we take into our account the pressure of a column of water four miles deep, it is impossible to say what effects this force might have produced. They might, besides, have been accumulated in clefts of rocks, in hollows, valleys, and caves; and have been there consolidated by petrifaction and the growth of calcareous matter over them. And that something similar to this actually happens, we are very certain; for Mr Whitehurst informs us, that "the springs of Matlock bath in Derbyshire, though extremely pellicled and friendly to the human constitution, are nevertheless plentifully saturated with calcareous matter, which readily adheres to vegetables and other substances imdered in their streams; and thus, by a constant accretion, large masses of flone are gradually formed. The banks on which the bath-houses stand, and likewise the buildings themselves, are mostly composed of such materials."—Now, had these waters directed their course over a bed of shells, through a burying-place, or over a field of battle, it is evident that they would have imbedded a great number of shells, human and horse bones, heads of lances, swords, or even the more powerful weapons of guns and pikes, which, to a curious naturalist, might have furnished an argument for the antiquity of these latter weapons. If therefore we see that bodies at this day may be so easily imbedded in flone, why should we pretend to set bounds to the petrifications which may have happened in the course of more than 4,000 years? a period far beyond the reach of our most ancient histories.

It is not meant, by what we have just now said, to explain all the appearances of fosil shells or bones from the deluge as a general cause. This cannot be done unless we knew all the circumstances. The following facts, however, may be looked upon as authenticated. 1. That when the waters overwhelmed the land, great numbers of marine animals were carried along with it. 2. That during its continuance most of these which have any locomotive power would choose rather to dwell over land than in places which had formerly been their residence. 3. That while the waters remained on the earth, all kinds of marine animals would breed over land in their natural way; and such as could not follow the waters in their retreat, would be left to die on dry land, which must have been the case particularly with shell-fish. 4. These impotent animals, which have little or no power of locomotion, would be buried in the pressure of a column of water four miles high be buried to depths unknown. 5. After the retreat of the waters, these which had been lodged in hollows or clefts, or perhaps diffused through the substance of many foft strata, might by some petrifying quality in the stratum be so consolidated along with it as afterwards to form one entire rock. This is evident, not only from the example of the Matlock springs, but more so from that of the pins found in the flone at Red-Ruth in Cornwall, from the petrified skull mentioned by Dr Plott, and many others, of which we shall mention the following from Mr Whitehurst. "The strata of limestone in Derbyshire, and in many other parts of England, abound with the exuviae of marine animals, or the impressions of them in the solid substance of the flone; and we have likewise several instances related by authors of the bones of terrestrial animals, and also of wood, having been found enveloped in strata of flone. A complete human skeleton, with British heads, chains, iron-rings, brafs bits of bridles, were dug up in a flone-quarry near the Earl of Widdrington's seat at Blankinay in Lincolnshire. Human bones and armour, with Roman coin, fibulae, &c, were found in a flone-pit in the park at Hifanton in Norfolk, supposed to have been buried after a battle. In the mountains of Cann, half a league from Meaf-frick, were found the remains of a crocodile which was served in a flate of sand-flone. The remains of a crocodile were also found in a flate of flone at Benheim. The beds of argillaceous flone, &c, incumbent on coal, also contains a great variety of figured fossils representing different parts of the vegetable creation.

From all these examples it is plain, that the lapidaceous power which the earth possefses is capable of incrusting bodies with flone to an unknown thickness. In whatever situation therefore we find these fosil bodies, we have no reason to say that the deluge was not ultimately the cause of their being there; because its power in spreading the earth with them, in burying them in it, or forcing them into clefts and caverns, is altogether unknown: and before it is denied that the deluge could be the cause of such appearances, it is necessary to show all that it really could do, which is evidently impossible; so that here our speculations must ultimately rest.

We shall only add one other fact which must certainly have taken place at the deluge. At that time the world is generally thought to have been very full of inhabitants. These, as well as all the inferior animals, would naturally fly from the approaching danger. This would assemble them in great numbers in such places as appeared to afford security; and here they would all perish together. This will account for vast heaps of bones found in certain parts of the world, as in the rock of Gibraltar, Dalmarla, &c, and the natural petrific power of the earth may account for their consolidation. The slayers which mankind have made of one another may indeed account for many of these appearances. When we read in history of 40,000, 50,000, or 100,000 men being killed in a battle, we never think of the space their bones would occupy when thrown into a heap; nevertheless, we are assured that the bulk of these remains must be very great. Tamerlane, with an army of 800,000 men, filled up the harbour of Smyrna by casting each of his soldiers throw one bone into it; and when Marcvs defeated the Cimbri, the bones of the slain were so numerous, that they were used for a long time as fences for vineyards. Had these been collected into one heap, and afterwards consolidated by petrific power, they would undoubtedly have occupied a very considerable space. What then must have been the case, when every man, nay every other terrestrial creature, died at once! Taking all these things into consideration, it must surprise us that the collections of fosil bones are not more numerious than we find them.
Earth. [258] Earth.

Dr Hutton's account of the formation of the strata considered. His theory overthrown by an experiment of Bergman's.

There is the strongest reason for denying that the land we inhabit has been for a length of time at the bottom of the sea. Dissipating therefore this part of Dr Hutton and Mr Whitehurst's theories, we shall now proceed to consider that of the former, where he investigates the formation of the strata. Thence, he says, could not be formed by aqueous solution. Thay they could not be so originally, we readily grant; but that they have preferved themselves from decay, transformed themselves into one another, and repaired their waste by this means, is absolutely certain. The Doctor indeed gives up his own argument, for he tells us, that if flint can be produced by crystallization from water or any aqueous solution, then may his assertions concerning the consolidation of the strata be denied." But Mr Bergman assures us, that he actually did produce flint by allowing a quantity of flour acid to stand for two years on some powdered quartz; and this is more than any chemist can pretend to do by the violent heat of fufion, to which Dr Hutton has recourse on all occasions. We do not pretend, however, to say, that the different strata of earth have been formed originally by aqueous solution. For this we must have recourse to the power already mentioned, and for want of which neither Dr Hutton's theory nor any other can support itself. But though the strata were originally formed by Divine power, they are certainly supported, repaired, and changed by natural causes; of which we shall now proceed to consider. In refolution, there may be, that there are various ways by which substances can be crystallized or assume regular figures.

1. The most common is by solution in a large quantity of water, from which the bodies are deposited by cooling, and form distinct and regular crystals. 2. By evaporation, as is the case with vitriolated tartar and some other salts. 3. By effusion, when a saline fluid is mixed with a quantity of earthy matter, and kept moist for some time. Of this we often have an example in moist cellars, or other damp places, where we shall see part of the walls covered with a fine, downy, saline matter. In salt-butter also we shall frequently see the same appearance, where the salt floats into small flakes, though in the common way it crystallizes in cubes. 4. By sublimation, as in the case of flowers of benzoin, of corrosive mercury, cinnabar, sal ammoniac, orpiment, &c. &c. 5. By distillation, in the case of flowers of benzoin, of corrosive mercury, cinnabar, sal ammoniac, orpiment, &c. &c. 6. By the meeting of two substances in an aerial form, as alkaline and fixed air. By the attraction of fixed air from the atmosphere or otherwise, as is the case with alkaline salts when long exposed to the common air, or for a shorter time to a stream of pure fixed air. 7. By precipitation, as in the arbor Diaæ and other metallic vegetables. 8. By means of acids. Thus the residuum of Glauber's spirit of nitre, if the distillation has been performed with an excess of acid, will float into beautiful ramifications like branches of trees. 9. By fusion, as in regulus of antimony and other metals, sulphur, &c.

Now of all these different ways by which crystallization may be effected, Dr Hutton has chosen only the last; and this he obstinately carries through the whole system.
Dr. Hutton's argument from the insufficiency of certain substances is briefly built upon the insufficiency of certain substances; but this argument has failed in one very remarkable instance, viz. that of mint, which has been produced by aqueous solution. Another instance he brings, no. 42, of "marmor metallicum, consisting of terra ponderosa saturated with vitriolic acid, a substance insoluble in water."

Now though this substance, when once it is formed, may be termed absolutely insoluble; yet the fact is certain, that it may be formed by aqueous solution and crystallization; and we have done so by the following process: Let terra ponderosa be formed into an hepar sulphuris by any of the common methods; dissolve the mass in water; filter the solution, and expose it to the air in a vessel kept in a gentle warmth; the precipitation of the sulphur will gradually fly off; the acid attach itself to the earth: and in a day or two a great quantity of fine crystalline sulphur will be formed, which are true marmor metallicum.

Thus we learn how many bodies, naturally insoluble, may yet be formed by aqueous solution by reason of the insufficiency of their component parts. Sulphur is soluble by calcareous earth and by terra ponderosa, and makes these substances soluble in much greater quantities than they naturally are. By the decomposition of the solution of terra ponderosa, marmor metallicum is produced; and by decomposing the other, selenite or alabaster. This last substance Mr. Hutton has not thought proper to mention, though huge masses of rock are composed of it; and it is incapable of union without being destroyed. Its regular figures, however, afford us a fine example of that species of crystallization which proceeds from precipitation or accretion. The selenite is a substance very little soluble in water; yet by the perpetual deposition of small quantities, we see that beautiful and regular crystals are formed; and hence we learn another important fact, viz. that in order to form these crystals, it is not always necessary that the whole of the substance should be dissolved in water at once, though this is the case with our artificial crystallizations. The largest and most transparent crystals, and even the most insoluble in water, may have been formed by the continual accretion of crystalline matter from an aqueous solution; and thus they may appear in any cavity whatever; for as there is no mineral substance impermeable to water, it evidently follows that no cavities can be impermeable to it.

Among his other insoluble substances Dr. Hutton mentions fluor and calcareous spar. But as we know that one of the component parts of fluor is calcareous earth, naturally soluble in water, it is only necessary to supple a calcareous water like that of Matlock to meet with fluor; and when as great quantities of fluor or would be produced as there are present of calcareous fience.

The same thing may be said of calcareous spar.—We know that fixed air will precipitate calcareous earth from water, or redissolve it after it has been precipitated, according to its quantity. The formation of spar, therefore, from calcareous matter dissolved in water and fixed air, may easily be understood; and we know that there is no water which does not contain some quantity of calcareous earth. Of fixed air there is always great plenty in the bowels of the earth; and according to the quantity uniting itself which the dissolved calcareous earth, either chalky concretions or crystalline bodies will be produced. If fire were applied to this calcareous matter in order to fuse it, an emission of the fixed air would be the certain consequence; and without this we have not the least evidence that calcareous earth ever did or could undergo any fusion by heat.

With regard to the mineralization of metals by sulphur, as in the case of pyrites, we cannot pretend to explain them particularly; though it was certainly incumbent on the Doctor to have formed these bodies, or to have produced something like them, by fusion, before he determined that they were formed originally in this way. It is easy, however, to see how the calc of a metal may meet with sulphur in the earth. We know that sulphur is soluble by alkali, by terra ponderosa, or by calcareous earth. By exposing this solution to fixed air, part of the sulphur is separated, and may unite with the metallic earth, or any other thing with which it has an affinity. The crystallizations of sulphur artificially united with metals have not indeed been examined; but before we affirm that a metal is mineralized by fusion with sulphur, we ought to perform something like it artificially, which never has been done.

As to the invincible argument no. 43, where our author triumphantly challenges his adversaries to show how petroflex, pyrites, and cinnabar, can be dissolved in water; it may be replied, that Mr. Bergman has decided the matter against him with regard to the first, by his remarkable experiment of making flint: the second is as yet undecided, for no chemist has been able to make pyrites either by solution or fusion. The third is likewise decided against our theorist; for Mr. Lewis has shown that cinnabar may be prepared by solution of sulphur as well as in the dry way by sublimation. We have only to suppose therefore that a calcareous solution of sulphur pervaded this mineral, while a number of particles of quicksilver were diffused through it; in which case the latter, attracting the sulphureous particles, would form the cinnabar in question.

Our author's arguments, (no. 44) from metals being found in their perfect state, is very inconclusive. The found native iron which he speaks of, is by many thought to be fatalitious; and as to the small bits of other metals sometimes found native, they rather make against him than otherwise: for had they been melted, all the rest of the matters around them must have been melted also; in which case the superior weight of the metals would have carried them to the bottom of the melted mass, there to unite as in a common furnace.

His arguments concerning luminous bodies are equally unfortunate with the rest. That coal is derived from wood has been the opinion of very learned men, particularly Dr. Black. The argument, however, is only this, that sometimes we see coals with woody fibres, plainly indicating their vegetable original. But this would hold equally with regard to fomes; for we often see wood penetrated with fibrous matter, while its fibrous texture still remains. In this case therefore we might as well suppose that fomes are derived from wood as that coals are so. A decisive proof that coals are not produced by fusion is, that
that a living toad has been taken out of the heart of a f lid piece of coal. This is similar to the entom¬
ment of the flies which called pholodes in the heart of stones; and as, in the latter case, we believe that the stone
has concreted round the fill, so we have the same rea
for believing, in the former case, that the coal had con
solidated round the toad. All that we can say there¬
fore is, that coal is formed by a natural, and not very
tedious process, unknown to us; but that this pro¬
ces certainly is not fusion. His proof no. 47 is alto¬
gether inconclusive; for we have already seen that flinty substances and marmor metallicum may be pro¬
duced by aqueous solution.

Thus we have seen, that, contrary to our author's
hypothesis, the world has undoubtedly had a begin¬
ing; that our dry land has not, for ages, been the
bottom of the sea; that we may reasonably suppose
the deluge to have been the cause of all or most of the
foil appearances of shells, bones, &c. we meet with,
that our author has erred in denying to aqueous
solution the effects which experience has shown it
capable of producing, and in ascribing to fusion ef¬
ects which experience doth not warrant; and that his
tory, far from having any foundation in chem¬
istry, is directly contradicted by that science. It
would be tedious and disagreeable to proceed farther
in animadverting on a theory so truly unphilosophical,
but rather elaborate and ostentatious in a display of facts:
we shall therefore content ourselves with taking notice
of one other objection to his doctrine, of which he him¬
self has been aware, with the answer he has given. The
objection is, That there are sometimes found flinty and
crystalline bodies containing water: It seems there¬
fore a contradiction to say that such were produced
by fusion. To this the Doctor replies, "It must not be
here objected, that there are frequently found sili¬
ceous crysfts and amethysts containing water; and
that it is impossible to confine water even in melted
glafs. It is true, that here, at the surface of the
earth, melted glass cannot, in ordinary circumstances,
bek made to receive and inclose confined water; but
let us only suppose a sufficient degree of compre¬
sion in the body of melted glass, and we can easily imagine
it to receive and confine water as well as any other
substance. But if, even in our operations, water, by
means of compression, may be made to endure the heat
of red-hot iron without being converted into vapour,
what may not the power of nature be able to per¬
form?"

On this reply we shall only observe, that the truth
of this hypothesis, as well as of all other parts of it,
may easily be put to the trial by those who have any
of these crystals in their possession. Let one of them
be broken, and the water it contains examined. If
the crystal has been formed by fusion at the bottom of
the sea, as Dr Hutton supposes, it will be fail; if
otherwise, fresh. As to his doctrine concerning sub¬
terranean heat and volcanoes, there will be occasion
to consider it under the article Volcano.

We must now take into consideration those remark¬
able changes which are supposed to have taken place
on the globe, in such a manner as entirely to have al¬
terd its appearance. These, however, do not appear
to have any solid foundation. Changes, no doubt,
have happened in particular parts; new lands have
been thrown up from the bottom of the sea by the force
of subterranean fire, and others have been swallowed
up. But these appear to be merely the effects of vol¬
canoes, which are common in many parts of the world;
and we are not warranted to conclude, because we see
a small volcanic island arise, and another destroyed
that this has been the cause with the whole habitable
world. — An imperfect theory hath indeed been sug¬
gested by Sir William Hamilton, Mr Brydone, and
others, concerning the use of volcanoes and subterrane¬
ous fires; from whence it might seem probable,
though they do not indeed say so in direct terms, that
all the dry land was originally thrown up from the bot¬
tom of the sea by the force of these fires. Sir William
Hamilton, in his letter to Dr Marty, broaches this
theory in the following words. "I am myself con¬
vinced, that the whole circuit, so far as I have exa¬
mined, within the boundaries marked in the map
(extend ing at least 50 Italian miles in length, and 30 in
breadth where broadest), is wholly and totally the pro¬
duction of subterraneous fires; and that most
probably the sea formerly reached the mountains that lie
behind Capua and Caserta, and are a continuation of the
Apennines. If I may be allowed to compare small
things with great, I imagine the subterraneous fires
to have worked in this country under the bottom of the
sea, as moles in a field, throwing up here and there a
hillock; and that the matter thrown out of some of
these hillocks formed into settled volcanoes, filling up
the space between the one and the other, has com¬
pose this part of the continent, and many of the islands,
adjacent."

From the observations I have made upon Mount
Aetna, Vesuvius, and the neighbourhood, I dare say
that, after a careful examination, most mountains that
are, or have been, volcanoes, would be found to owe
their existence to subterraneous fire; the direct proofs
of what I find the commonly received opinion. — Na¬
ture, though varied, is certainly in general uniform in
her operations; and I cannot conceive that two such
considerable volcanoes as Aetna and Vesuvius, should
have been formed otherwise than by other consider¬
able volcanoes of the known world. I do not wonder
that so little progress hath been made in the improve¬
ment of natural history, and particularly in that branch
of it which regards the theory of the earth: Nature
acts slowly; it is difficult to catch her in the fact.

From repeated observations I have made in the
neighbourhood of Vesuvius, I am sure that no virgin
foil is to be found there; and that all is composed of
different strata of erupted matter, even to a great depth
below the level of the sea. In short, I have not any
doubt in my own mind but that this volcano took its
tise from the bottom of the sea; and as the whole plain
between Vesuvius and the mountains behind Caserta,
which is the belt part of Campagna Felice, is (under
its good foil) composed of burnt matter, I imagine
the sea to have washed the feet of those mountains,
until the subterraneous fires began to operate, at a pe¬
riod certainly of a most remote antiquity.

The soil of the Campagna Felice is very fertile;
I saw the earth opened in many places. The firstrate
of good foil was in general four or five feet thick; un¬
der which was a deep firstrate of cinders, pumice, frag¬
ments of lava, and such burnt matter as abounds near
Mount Vesuvius and all volcanoes. The mountains at the back of Caprea are mostly of a sort of lime-stone, and very different from those formed by fire; though Signor Van Vitelli, the celebrated architect, has assured me, that in the cutting of the famous aqueduct of Capfera through these mountains, he met with some soils that had evidently been formed by subterraneous fires. The high grounds which extend from Castel-a-Mare to the point of Minerva towards the island of Caprea, and from the promontory which divides the bay of Naples from that of Salerno, are of lime-stone. The plain of Sorrento, that is bounded by these high grounds, beginning at the village of Vico, and ending at that of Maife, is wholly composed of the same sort of tufa as that about Naples, except that the cinders or pumice-stones intermixed in it are larger than in the Naples tufa. I conceive, then, that there has been an explosion in this spot from the bottom of the sea. This plain, as I have remarked to be the cape with all soils produced by subterraneous fire, is extremely fertile; whilst the ground about it, being of another nature is not so. The island of Caprea does not shew any signs of having been formed by subterraneous fire, but is of the same nature as the high grounds last mentioned; from whence it has probably been detached by earthquakes, or the violence of the waves. Rovigiano, an island, or rather a rock, in the bay of Castel-a-Mare, is likewise of lime-stone, and seems to have belonged to the original mountains in its neighbourhod; in some of these mountains also, there are pumice-stones and foul shells, which I have never found in the mountains which I suppose to have been formed by explosion. Bracini, however, in his account of the eruption of 1614, says, that he found many forts of sea-shells on Vesuvius after that eruption; and P. Ignatius in his account of the same eruption, says, that he and his companions picked up many shells likewise at that time upon the mountain: this circumstance would induce one to believe, that the water thrown out of Vesuvius during that formidable eruption came from the sea.  

This may serve to shew upon what grounds the volcanic theory stands; but though we should admit it in its utmost extent, the theory of the earth can receive but very little assistance from it. Sir W. Hamilton himself does not say that all the mountains have been volcanoes, or that all the soil throughout the different quarters of the world hath been thrown up from the bottom of the sea. If, therefore, there remains but one mountain in the whole world which never was a volcano, we shall be as much disqualified to account for the production of that one, as though there were ever so many; and at any rate our theory will be absolutely useles, because what will account for the origin of that mountain, will also account for the origin of others. If we go a step beyond our author, and say, that there are no mountains whatever that have not been originally volcanoes, but that all the dry land is the production of subterraneous fires, our difficulties are so far from being removed, that they are greatly increased. The laves and volcanic ashes, though in time they become covered with an exceedingly fertile soil, remain absolutely barren for a great number of years; in which that, by the adopters of the volcanic hypothesis, the period at which Moses fixes the creation is reckoned by far too late to have given time for covering the many lavas of Italy and Sicily with the depth of earth they just now have upon them. The whole world therefore must have remained for many ages in a state of absolute sterility; and by what means or in what corner of the world vegetation first began, remains to be inquired into.

Without entering further into the theories either of Sir W. Hamilton or any other person, it is easy to see, that all of them are insufficient to solve the difficulties mentioned in the Common. It is common to account for the obsolete figure of the earth, from the greater centrifugal force of the equatorial parts than of the polar ones; but this explication can by no means be deemed sufficient. The globe we inhabit is composed of two very different kinds of matter, earth and water. The former has a very considerable power of cohesion, besides the gravitating power; the latter has very little cohesion, and its parts may be separated from each other by whatever will overcome its weight. It follows, therefore, that the solid parts of the earth, resisting, by their cohesion, the centrifugal force more than the water, ought not to dilate so much. The waters of the ocean therefore ought, about the equator, to swell up, and overflow the land; and this they ought to do at this present moment as much as at the first creation. That this ought to be the case, is evident from the phenomena of the tides. It is not to be doubted but that the attraction of the moon affects the solid earth as well as the sea; but because of the greater cohesion of the former, it cannot yield as the ocean does, and therefore the waters are raised to some height above it. Mr. Whitehurst and others indeed solve this difficulty by supposing the earth to have been originally fluid. But this is arguing in a circle: for if we desire them to prove this original fluidity, they will do it by the obsolete figure of the earth; and if the cause of the obsolete figure is required, they refer us to the original fluidity. See Whitehurst's Inquiry. The height to which the waters would have covered the equatorial parts by the centrifugal force, must have been equal to the depression at the poles; which, according to M. Buffon, is about 17 miles; according to other mathematicians, 25 or 26 miles. 

The other difficulties are so totally inexplicable, that Buffon, who seems to exist himself as much as possible in order to remove them, is obliged at last to own, that the earth is in a perishing state; that the hills will be levelled, and the ocean at last cover the whole face of the earth; a prophecy which wears no very favourable aspect to the inhabitants of this globe. For these imaginations, however, there does not seem to be the smallest foundation in nature. The mountains have continued what they were, from the earliest accounts of time, without any signs of decay. Mount Aetna, beside the waft common to it with other mountains, hath been exhausting itself by throwing out incredible quantities of its own substance; yet it still seems to be what it was called by Pindar 2200 years ago, the pillar of heaven. It seems extremely probable, therefore, that there are powers in the system of nature which tend to preserve, and are capable of counteracting those which tend to destroy, the mountains; and perhaps
haps the late discovery concerning the attraction on mountains may some time or other throw some light on the nature of these powers. See M. Hutchenson.

The like may be said of the isthmuses or narrow necks of land which in some parts of the world join different countries together; such as the isthmus of Darien, of Suez, and Morea, &c. Though the ocean seems to bear on these with great violence, they are never diminished in bulk, or washed away, as, according to Buffon's theory, they ought to be. It is plain, therefore, that there is in nature some power by which these narrow necks of land are preserved from the fury of the ocean; for history does not afford one instance of any neck of land of this kind being broken down by the sea.—It seems impossible to solve the difficulties with regard to the strata and shells by any other means than supposing, that there are in the terrestrial matter several distinct powers, by which the strata of any particular kind are occasionally transformed into others; and that the shells and other marine bodies were originally deposited on the surface by the deluge. The volcanic hypothesis, by some attempt to account for the appearance of these bodies, will not in shape answer the purpose. By the explosions of a volcano, shells, mud, sand, &c. might be indiscriminately thrown up, and scattered irregularly about, but we could never find the large beds of shells which are frequently to be met with of a considerable extent in different parts of the earth.

With regard to any degree of certainty, it is scarcely to be hoped for on this subject. The common notion of the earth's being originally a chaos, seems neither to have a foundation in reason, nor in the Mosnic account of the creation. It is purely inconsistent with the wisdom ascribed to the Deity, to think that he would create this visible system in confusion, and then employ it to put itself in order. It seems more probable, that the earth was originally created with the inequalities of surface we see it have, and that the natural powers for preserving it were afterwards superadded. Thus, according to Moses, the natural agents created, or produced, by directing matter to move in a certain manner, was light. This, we know, was absolutely necessary for the evaporation of the water which took place on the second day. Moses tells us, that the earth was originally covered with water; and we see a natural reason why it should be so; namely, that the evaporation by the atmosphere might more easily take place. When this was done, there being then no more occasion for the waters in that diffused state, they were commanded to recede into the place appointed for them, and thus formed the ocean. Whether this was done by the action of gravity then first taking place, or by any other means, we have it not in our power to know, nor will our speculations on this subject probably be attended with much benefit. We see, however, that the Mosnic account of the creation perfectly consistent with itself, and free from those difficulties with which other systems are clogged. It is impossible to show, how, by any natural power, a confused mass of matter, such as the chaos of the ancient poets, of Drs Burnet and Woodward, the hollow globe of Mr Hutchinson, the comet of Mr Whiston, or the vitrified matter of M. Buffon, could put itself in the order in which we see it. The sacred historian simply tells us, that God created the heavens and the earth; that the heavens gave no light, and the earth was covered with water. He first commanded the light to shine, then the air to take up what quantity of water he thought proper for the purposes of vegetation. After this, the dry land was made to appear; and the different powers of vegetation already taken notice of were given to it. Next the sun and moon were created as subordinate agents, to divide the light from the darkness, &c. Then followed the formation of animals and of man.

According to this account, it would appear, that Mosnic account of what we call the laws of nature, were given to preserve the creation perfectly consistent.

From some observations of Sir W. Hamilton and others, objections have been drawn, as hath been already mentioned, to the Mosnic chronology. These objections are in substance as follows. In pits, and other natural and artificial openings of the ground, in the neighbourhood of Vulcainus and &c., several beds of matter have been discovered at considerable depths below each other. These beds of lava in some places are covered with successive strata of vegetable mould. From this disposition of materials, Sir William concludes that the world must have been created at a much more remote period than is generally believed. The different strata of lava found below ground, he observes, must have proceeded from an equal number of eruptions from the mountain; and such of them as are covered with vegetable soil must have remained at least 1000 years on the surface before they could be converted into mould sufficient for the purposes of vegetation. Ten or twelve successive strata overlaid with soil have already been discovered in the bowels of the earth; and it has been strongly asserted, that, by digging deeper, many more might have been found. Now, allowing 1000 years for each stratum of lava, which the supporters of this theory affirm to be too little, the antiquity of the earth cannot be less than 12,000 years, which is more than double its age according to the Mosnic account.

The principal fact in this theory is, that 1000 years are necessary to the production of a soil sufficient for the nourishment and growth of vegetables upon volcanic lavas. This notion is confirmed by a conjecture of the Canonico Recupero, that streams of lava in Sicily have lain for centuries without acquiring a vegetable mould; and by some obscure accounts, that these lavas have proceeded from eruptions of Etna, above 1000 years ago. The following considerations, however, will render this theory at least extremely dubious.

Sir William informs us, that some lavas are very solid, and resist the operation of time much longer than another kind, which, he says, is so firmacious, the particles separating as they force their way out, just like meal
meal coming from under the grindstones. A stream of lava of this sort (he judiciously observes), being less compact, and containing more earthy particles, would certainly be much sooner fit for vegetation than one composed of the more perfect vitrified matter. He has not, however, ventured to determine whether these lavas found below ground were of the former or latter quality; a circumstance which materially affects the justness of his calculation.

That soil gradually increases by decayed vegetation, and the sediment deposited by snow and rain, is an undeniable fact. The thicknesses or thinness of soil indicates a greater or lesser time of accumulation. But Sir William has not informed us of the dimensions of his subterraneous vegetable strata; a circumstance of great moment in instituting a calculation of their different eras.

Besides, eruptions of volcanoes are often accompanied with incredible quantities of ashes, which fall thick upon all the ground for many miles round; intended by nature, it would appear, quickly to repair the barrenness occasioned by the lava. The muddy water sometimes thrown out may co-operate powerfully with the ashes in producing the same happy effect.

But Sir William has furnished us with facts of a more important nature. The town of Herculaneum was destroyed by an eruption in the 7th year of the Christian era. There are evident marks, says he, that the matter of six eruptions has taken its course over Herculaneum; for each of the six strata of lava is covered with a vein of good soil. Here we have Sir William’s own authority for six strata of good soil, accumulated in less than 1700 years; which, supposing them to be all of equal thickness, instead of 1000 years, leaves not 200 to the production of each.

From the same authority we learn, that the crater on the top of the Monte Nuovo, or New Mountain, which was thrown up by subterraneous fire no farther back than the year 1538, is now covered with shrubs.

There is not on record any eruption from the great crater of Veluvious from the year 1139 to 1631, a period of only 292 years. But Bracini, who descendcd into it not long before the 1631, tells us, “that the crater was five miles in circumference, and about 1000 paces deep. Its sides were covered with bullock wood, and at the bottom there was a plain on which cattle grazed. In the woody parts, boars frequently harboured.”

The correspondence of these facts, related by Sir William himself, with his favourite notion that 1000 years are necessary for the production of vegetable soil, we leave to the reader’s consideration; and shall conclude with a few remarks of a different kind.

The appearance of a stratum of lava below ground, though not covered with vegetable soil, our author considers as demonstrative evidence, that such stratum formerly lay above the surface, and was thrown out by an eruption. This inference, however, seems not altogether just. Nothing with propriety, receives the denomination of an eruption, unless when lava or other matter is hurled from the crater, or from some new opening made in the mountain. But it deferves notice, that, in the environs of volcanoes, earthquakes are frequent. That these violent concussions are the genuine produce of subterraneous fire expanding itself in every direction, and making strong efforts against every substance which resists the natural tendency of its course, is a fact that cannot admit of doubt. It is no less certain, that these frequent concussions shake and dislodge the internal parts of the earth. They cannot fail to disturb and disarrange the natural direction of the original strata; and, of course, they must give rise to many subterraneous cavities and fissures. The nearer the great furnace, which confines the fury of the flames, the greater and more frequent will be the cavities. Every earthquake occasioned by a volcano is nothing else than an effort of the burning matter to enlarge the boundaries by which it is usually limited. If the quantity of matter and degree of inflammation require a space greatly superior to the internal cavities, an eruption above the surface is an infallible consequence; but when the quantity of matter, or the expansive force occasioned by the degree of inflammation, is insufficient to raise the lava to the top of the mountain, an escape may be produced; and a volcano, by appearing over and below the surface, may run below ground in plentiful streams, and fill up all the subterraneous cavities and channels. These internal strata of lava may often lie so deep as to be below the level of the sea. In this manner we conceive it to be not only possible, but extremely probable, that beds of lava, having no covering of vegetable soil, may be found at great depths, although they never were above the surface.

It is much more reasonable to conclude, that lavas with a layer of soil were produced by eruptions, and once lay above the surface, till covered by the operation of time, or by frequent streams from the mouth of the volcano. But even in this case, the argument is not altogether complete; for, as above remarked, earthquakes, with which countries adjacent to volcanoes are perpetually infested, often sink large tracts of land to great depths.

The other parts of the theory of the earth regard the situation of the different parts of its surface with respect to each other; its annual motion round the sun as a planet; its diurnal motion round its axis; and the different strata whereof it is composed, as far as it hath been hitherto found practicable to penetrate into it: for all which, see the articles Geography, Astronomy, Mines, Strata, &c.

*Smell and Bath of the Earth.* See Agriculture, no 10.

*Breeds made of Earth.* See Bread.

*Earth-Flax.* See Amianthus.

*Earth-Nuts or Ground-Nuts,* the roots of the Arachis hypogaea of Linnaeus. They are composed of several small round bulbs or knobs; whence they were termed by Dodonaeus, terre glandes or earth-nuts. They are esteemed an excellent food by the Siberians. In Holland likewise, they are sold in the markets and used for food. The native country of this plant seems to be Africa; though, at present, all the American settlements abound with it; but many persons who have resided in this country affirm that they were originally brought by the slaves from Africa. The plant multiplies very fast in a warm country; but being very impatient of cold, it cannot be propagated in the open air.
Earth, Earthquake.

Air in Britain. The seeds must therefore be planted in a hot-bed in the spring of the year; and when the weather proves warm, they may be exposed to the open air by degrees. The branches of the plant trail upon the ground; and the flowers, which are yellow, are produced single upon long footstalks; and as soon as the flower begins to decay, the germen is thrust underground, where the pod is formed and ripened; so that unless the ground is opened, they never appear; the roots are annual, but the nuts or seeds sufficiently flock the ground in a warm country where they are not carefully taken up.

Earth-Nuts or Pec-Nuts. See Bunium.

Earth-Pucerons, in natural history, a name given by authors to a species of puceron very singular in its place of abode. In the month of March, if the turf be raised in several places in any dry pastures, there will be found, under some parts of it, clusters of ants; and, on a farther search, it will be usually found, that these animals are gathered about some pucerons of a peculiar species. These are large, and of a greyish colour, and are usually found in the midst of the clusters of ants.

The common abode of the several other species of pucerons is on the young branches or leaves of trees; as their only food is the sap or juice of vegetables, probably these earth kinds draw out those juices from the roots of the grasses, and other plants, in the same manner that the others do from the other parts. The ants that conduct us to these, are also our guides where to find the greater part of the others: the reason of which is, that as these creatures feed on the succulent juices of plants they are evacuated from their bodies in a liquid form, very little altered from their original state; and the ants, who love such food, find it ready prepared for them in the excrements which these little animals are continually voiding. It has been suppos’d by some, that these were the common pucerons of other kinds, which had crept into the earth to preserve themselves from the rigour of the winter. But this does not appear to be the case; for they are usually met with in places very distant from trees or plants, on which they should be suppos’d before to have fed; and it is very certain, that though many of these insects are killed by the cold, yet many escape, and are found very early in the spring, sucking the buds of the peach-tree. There is no doubt of these creatures being in a feeding condition when under ground; because otherwise the ants would have no temptation to follow them; and it is equally certain, that the several species of the pucerons, like those of the caterpillar kinds, have each their peculiar herbs on which they feed, as many of them will die of hunger rather than feed on any others; and it is not at all likely, that these earth pucerons had been used to feed on leaves of trees and plants, and had left that food for the roots of grass.

Earth-Worms. See Luminicous.

Earthquake, in natural history, a sudden and violent concussion of the earth, generally attended with strange noises under ground or in the air; often destroying whole cities at once, throwing down rocks, altering the course of rivers, and producing the most terrible deviations.

Though there is hardly any country known in which shocks of an earthquake have not at some time or other been felt, yet there are some much more subject to them than others. It hath been observed, that northern countries in general are less subject to earth-quakes than those situated near the equator, or in trying the southern latitudes; but this does not hold universally; for they are more subject to earthquakes than continents; but neither does this hold without exceptions. Some particular parts of continents and some particular islands, are more subject to them than others lying in the neighbourhood, and differing very little from them in external appearance. Thus, Portugal is more subject to earthquakes than Spain, and the latter much more than France; Mexico and Peru more than the other countries of America, and Jamacia more than the other Caribbee island. Earthquakes are frequent, though not often violent, in Italy; but in Sicily they are often terribly destructive. Asia Minor has been remarkably subject to them in the remotest antiquity; and the city of Antioch in particular has been more from earthquakes than any other in that country. The same phenomena are said also to occur very frequently in the north-eastern extremities of Asia, even in very high latitudes.

Though there is no phenomena in nature more calculated to impress the human mind with terror, and their phenomena to be well remembered and taken notice of, than earthquakes; yet the philosophy of them is but incomplete. The history of earthquakes is very incomplete. The destruction occasioned by them engrosses the mind too much to admit of philosophical speculations at the time they happen: the fame thing prevents the attentive consideration of the alterations that take place in the atmosphere after the earthquake is over, and which might probably throw some light on the causes which produced it: and the suddenness of its coming on prevents an exact attention to those phenomena. From what observations have been made, however, the following phenomena may be deduced, and reckoned very certain.

1. Where there are any volcanoes or burning mountains, earthquakes may reasonably be expected more frequently than in other countries.
2. If the volcano hath been for a long time quiet, a violent earthquake is to be feared, or vice versa. But to this there are many exceptions.
3. Earthquakes are generally preceded by long droughts; but they do not always come on as soon as the drought ceases.
4. They are also preceded by electrical appearances in the air; such as the aurora borealis, falling stars, &c.: but this does not hold universally.
5. A short time before the shock, the sea swells up, and makes a great noise; fountains are troubled, and send forth muddy water; and the beasts seem frightened, as if sensible of an approaching calamity.
6. The air at the time of the shock is generally calm and serene; but afterwards commonly becomes obscure and cloudy.

7. The
7. The shock is accompanied with a rumbling noise, sometimes like that of carriages; sometimes a rushing noise like wind, and sometimes explosions like the firing of a cannon are heard. Sometimes the ground heaves perpendicularly upwards, and sometimes rolls from side to side. Sometimes the shock begins with a perpendicular heave, after which the other kind of motion commences. A single shock is but of very short duration, the longest scarcely lasting a minute; but they frequently succeed each other at short intervals for a considerable length of time.

8. During the shock, chafms are made in the earth; from which sometimes flames, but oftener great quantities of water, are discharged. Flame and smoke are also emitted from places of the earth where no chafms can be perceived. Sometimes these chafms are but small; but, in violent earthquakes, they are frequently so large that whole cities sink down into them at once.

9. The water of the ocean is affected even more than the dry-land. The sea swells to a prodigious height; mud, sand, and water are jumbled together and then immediately throwing them down into deep pits. Sometimes it is divided to a considerable depth; and great quantities of air, flames, and smoke, are discharged from it. These irregular agitations happen to the waters of ponds, lakes, and even rivers.

10. The shock is felt at sea as well as on land. Ships are affected by a sudden froike, as if they had run aground or struck upon a rock.

11. The effects of earthquakes are not confined to one particular district or country, but often extend to very distant regions, though no earthquake hath yet been known extensive enough to affect the whole globe at one time. In those places also where the storm is not felt on dry land, the irregular agitation of the waters above-mentioned is perceived very remarkably.

Account of the earthquake in Jamaica in 1692.

All these positions are verified by the accounts of those earthquakes which have been particularly described by witnesses of the best character. In 1692, an earthquake happened in Jamaica, attended with almost all the terrible circumstances above-mentioned. In two minutes, it destroyed the town of Port Royal, at that time the capital of the island; and sunk the houses in a gulph 40 fathoms deep. It was attended with a hollow rumbling noise like that of thunder: the streets rose like the waves of the sea; first lifting up the houses, and then immediately throwing them down into deep pits. All the wells discharged their waters with the most violent agitation. The sea burst over its bounds, and deluged all that stood in its way. The figures of the earth were in some places so great, that one of the streets appeared twice as broad as formerly. In many places it opened and closed again; and continued this agitation for some time. Of these openings, great numbers might be seen at once. In some of them, the people were swallowed up at once; in others, the earth closed them by the middle, and crushed them to death; while others, more fortunate, were swallowed up in one chasm, and thrown out alive by another. Other chafms were large enough to swallow up whole streets; and others, still more formidable, spouted up immense quantities of water; drowning such as the earthquake had spared. The whole was attended with fountains and offensive smells, the noise of falling mountains at a distance, &c.: and the sky, in a minute's time, was turned dull and reddish, like a glowing oven. Yet, as a greater sufferer as Port Royal was, more houses were left standing therein than on the whole island besides. Searce a planting-house, or sugar-house, was left standing in all Jamaica. A great part of them were swallowed up, houses, people, trees, and all, in one gap; in lieu of which, afterwards appeared great pools of water; which, when dried up, left nothing but sand, without any mark that ever tree or plant had grown thereon. The shock was so violent, that it threw people down on their knees or their faces as they were running about for shelter. Several houses were flung down out of their places, and yet continued standing. One Hopkins had his plantation removed half a mile from the place where it stood, without any considerable alteration. All the wells in the island, as well as those of Port Royal, from oneathom to fix or seven deep, threw their water out at the time with great violence. Above 21 miles from the sea, the earth gaped and spouted out, with a prodigious force, vast quantities of water into the air: yet the greatest violence were among the mountains and rocks; and it is a general opinion, that the nearer the mountains, the greater the shock; and that the cause thereof lay among them. Most of the rivers were stopped up for 24 hours by the falling of the mountains; till swelling up, they made themselves new tracks and channels; tearing up, in their passage, trees, &c. After the great shock, those people who escaped got on board ships in the harbour, where many continued above two months: the shocks all that time being so violent, and coming so thick, sometimes two or three in an hour, accompanied with frightful noises like a rushing wind, or a hollow rumbling thunder, with brimstone-blasts, that they durst not come ashore. The consequence of the earthquake was a general fickness, from the noisome vapours belched forth, which swept away above 3000 persons.

A still more terrible account, if possible, is that given by Kircher, of the earthquake which happened in Calabria in the year 1638. This instance is an exception to the second general position above laid down. In Italy, there had been an eruption of Mount Vesuvius five years before; and in Sicily there had been an eruption of Etna only two years before this earthquake. The event, however, plainly showed, that the cause of the earthquake, whatever it was, had a connection not only with Mount Etna, which lies in the neighbourhood, but also with the volcano of Stromboli, which is 60 miles distant. "On the 24th of March (says Kircher), we landed (in a small boat) from the harbour of Messina in Sicily, and arrived the same day at the promontory of Pelorus. Our destination was for the city of Euphemia in Calabria; but on account of the weather, we were obliged to continue three days at Pelorus. At length, weared with the delay, we resolved to prosecute our voyage; and although the sea seemed more than usually agitated, yet we ventured forward. The gulph of Charybdis, which we approached, seemed whirled round in such a manner as to form a vast hollow, verging to a point in the centre. Proceeding onward, and turning my eyes to Mount Etna, I saw it cast forth large volumes of smoke, of
In 1693 an earthquake happened in Sicily, which may justly be accounted one of the most terrible of which we have any account. It shook the whole island; and not only that, but no other one place

mountainous fize, which entirely covered the island, and blotted out even the shores from my view. This, together with the dreadful noise, and the sulphurous fench, which was strongly perceived, filled me with apprehensions that some more dreadful calamity was impending. The earth itself seemed to wear a very apprehensive appearance; those who have seen a lake in a violent flower of rain all covered over with bubbles, will have some idea of its agitations. My surprize was still increased by the calmness and serenity of the weather; not a breeze, not a cloud, which might be supposed to put all nature thus into motion. I therefore warned my companions, that an earthquake was approaching; and, after some time, making for the shore with all possible diligence, we landed at Tropæa. But we had scarce arrived at the Jesuits college in that city, when I found the boat in which I had landed, and my companions also. Leaving this seat of delolation, we proceeded on our voyage along the coast; and the next day came to Rochetta, where we landed, although the earth still continued in violent agitations. But we were scarce arrived at our inn, when we were once more obliged to return to our boat; and in about half an hour we saw the greatest part of the town, and the inn at which we were staying, all mounted up, dashed to the ground, and burying all its inhabitants beneath its ruins. Proceeding onward in our little vessel, we at length landed at Lipizium, a castle midway between Tropæa and Euphemia the city to which we were bound. Here, wherever I turned my eyes, nothing but scenes of ruin and horror appeared; towns and castles levelled to the ground; Stromboli, though at 60 miles distance, belching forth flames in an unusual manner, and with a noise which I could distinctly hear. But my attention was quickly turned from more remote to contiguous danger. The rumbling sound of an approaching earthquake, which by this time we were grown acquainted with, alarmed us for the consequences. It every moment seemed to grow louder, and to approach more near. The place on which we stood began to shake most dreadfully; so that, being unable to stand, my companions and I caught hold of whatever shrub grew next us, and supported ourselves in that manner. After some time, the violent paroxysm ceasing, we again stood up, in order to prosecute our voyage to Euphemia, which lay within sight. In the mean time, while we were preparing for this purpose, I turned my eyes towards the city; but could see only a frightful dark cloud, that seemed to rest upon the place. This the more surprized us, as the weather was very serene. We waited, therefore, till the cloud was passed away; then turning to look for the city, it was totally sunk; and nothing but a dismal and putrid lake was to be seen where it stood."

In 1693 an earthquake happened in Sicily, which may justly be accounted one of the most terrible of which we have any account. It shook the whole island; and not only that, but no other one place in Sicily was visited by such an event. In that country to keep on their legs the dancing earth; nay, those that lay on the ground were rolled from side to side as on a rolling billow: high walls leaped from their foundations several paces, &c. The mischief it did is amazing; almost all the buildings in the countries were thrown down. Fifty-four cities and towns, besides an incredible number of villages were either destroyed or greatly damaged. We shall only instance the fate of Catania, one of the most famous, ancient, and flourishing cities in the kingdom; the residence of several monarchs and an university. This once famous city had the greatest share in the tragedy. Father Anthon. Serroviata, being on his way thither, and at the distance of a few miles, observed a black cloud like night hovering over the city; and there arose from the mouth of Montgibello great spires of flame, which spread all around. The fear of a sudden beginning to roar and rise in billows; and there was a blow, as if all the artillery in the world had been at once discharged. The birds flew about astounded; the cattle in the fields ran crying, &c. His and his companions horses flapped short, trembling; so that they were forced to alight. They were no sooner off, but they were lifted from the ground above two palms; when casting his eyes towards Catania, he with amazement saw nothing but a thick cloud of dust in the air. This was the scene of their calamity; for of the magnificent Catania, there was not the least footprint to be seen. S. Bonajutus affures us, that of 18,900 inhabitants, 18,800 perished therein.

The great earthquake, however, which happened on the 1st of November 1755, affords the clearest example of all the phenomena abovementioned: having been greatly felt violently in many places both on land and at sea; and extended its effects to the waters in many other places where the shocks were not perceived. At Lisbon, in Portugal its effects were most severe. In 1750, At Lisbon, there had been a sensible trembling of the earth felt in this city: for four years afterwards, there had been an excessive drought; in so much that some springs, formerly very plentiful of water, were dried and totally lost. The predominant winds were north and north-east, accompanied with various, though very small, tremors of the earth. The year 1755 proved very wet and rainy; the summer cooler than usual; and for 40 days before the earthquake, the weather was clear, but not remarkably so. The last day of October, the fun was obscured, with a remarkable gloominess in the atmosphere.

The first of November, early in the morning, a thick fog arose, which was soon diffipated by the heat of the sun; no wind was stirring; the sea was calm; and the weather as warm as in June or July in this country. At 35 minutes after nine, without the least warning, except a rumbling noise not unlike the artificial thunder in our theatres, a most dreadful earthquake shook, by short but quick vibrations, the foundations of all the city; so that many buildings instantly fell. Then, with a fearfully perceptible pause, the nature of the motion was
At Oporto. At Oporto (near the mouth of the river Douro), the ten.

The earthquake lasted in all about six minutes. At the moment of its beginning, some persons on the river, near a mile from the city, heard their boat make a noise as if it had run aground, though they were then in deep water; and at the same time they saw the houses falling on both sides of the river. The bed of the river Tagus was in many places raised to its surface. Ships were driven from their anchors, and jolted together with great violence; nor did their masters know whether they were afloat or aground. A large new quay sunk to an unfathomable depth, with several hundreds of people who were upon it; nor was one of the dead bodies ever found. The bar was at first seen dry from shore to shore; but suddenly the sea came rolling in like a mountain; and about Belém Castle the water rose 50 feet almost in an instant. About noon there was another shock; when the walls of several houses that yet remained were seen to open from top to bottom more than a quarter of a yard, and afterwards closed again so exactly that fear of any mark of the injury was left.

At Colares, about 20 miles from Lisbon, and two miles from the sea, on the last day of October, the weather was clear, and uncommonly warm for the season. About four o'clock in the afternoon there arose a fog, which came from the sea, and covered the valleys; a thing very unusual at that season of the year. Soon after, the wind changing to the east, the fog returned to the sea, collecting itself, and becoming exceeding thick. As the fog retired, the sea rose with prodigious roaring. The first of November, the day broke with a serene sky, the wind continuing at east; but about nine o'clock the fog began to grow dim; and about half an hour after was heard a rumbling noise like that of chariots, which increased to such a degree, that it became equal to the explosions of the largest cannon. Immediately a shock of an earthquake was felt, which was quickly succeeded by a second and third; and at the same time several light flashes of fire issued from the mountains, resembling the kindling of charcoal. In these three shocks, the walls of the buildings moved from east to west. In another situation, from whence the sea-coast could be discovered, there issued from one of the hills called the Pico a great quantity of smoke, very thick, but not very black. This hill increased with the fourth shock, and afterwards continued to issue in a greater or less degree. Just as the subterraneous rumblings were heard, the smoke was observed to burst forth at the Pico; and the quantity of smoke was always proportioned to the noise. On visiting the place from whence the smoke was seen to arise, no signs of fire could be perceived near it.

At Oporto (near the mouth of the river Douro), the earthquake began about 40 minutes past nine. The sky was very serene; when a dreadful hollow noise like thunder, or the rattling of coaches at a distance, was heard, and almost at the same instant the earth began to shake. In the space of a minute or two, the river rose and fell five or six feet, and continued to do so for four hours. It ran up at first with so much violence, that it broke a ship's hatchway. In some parts the river opened, and seemed to discharge vast quantities of air; and the agitation in the sea was so great about a league beyond the bar, that air was supposed to have been discharged there also.

At St. Ube's, a sea-port town about 20 miles south of Lisbon, was entirely swallowed up by the repeated shocks and the vast turbid of the sea. Huge pieces of rock were detached at the same time from the promontory at the west end of the town, which consists of a chain of mountains containing fine Jasper of different colours.

The same earthquake was felt all over Spain, except at Ayamonte in (near where the Gaudiana falls into the Bay of Cadiz), a little before 10 o'clock on the first of November, the earthquake was felt; having been immediately preceded by a hollow rushing noise. Here the shocks continued for 14 or 15 minutes, damaged almost all the buildings, throwing down some, and leaving others irreparably shattered. In little more than half an hour after, the sea and river, with all the canals, overflowed their banks with great violence, laying under water all the coasts of the islands adjacent to the city and its neighbourhood, and flowing into the very streets. The water came on in vast black mountains, white with foam at the top, and demolished more than one half of a tower at the bar named De Canaia. In the adjacentdistricts every thing was irrecoverably lost; for all that was overthrown and the beach became a sea, without the least resemblance of what it was before. Many persons perished; for although they got aboard some vessels, yet part of these foundered; and others being forced out to sea, the unhappy passengers were so terrified, that they threw themselves overboard. The day was serene, and not a breath of wind stirring.

At Cadiz, some minutes after nine in the morning, the earthquake began, and lasted about five minutes. The water of the cisterns under ground washed backwards and forwards, so that a great froth arose. At ten minutes after eleven, a wave was seen coming from the sea, at eight miles distance, at least 60 feet higher than usual. It dashed against the west part of the town, which is very rocky. Though these rocks broke a good deal of its force, it at last came upon the city walls, beat in the breastwork, and carried pieces of the building of eight or ten ton weight to the distance of 40 or 50 yards. When the wave was gone, some parts that are deep at low water, were left quite dry; for the water returned with the same violence with which it came. At half an hour after it came a second wave, and after that four other remarkable ones; the first at ten minutes before twelve; the second, half an hour before one; the third, ten minutes after one; and the fourth, ten minutes before two. Similar waves, but smaller, and gradually lessening, continued with uncertain intervals till the evening.

At Gibraltar, the earthquake was not felt till after night, and lasted about half a minute. Then followed a violent shock; after that, a trembling of the earth for five or six seconds; then another shock not 50 violent as the first, which went off gradually as it began. The whole lasted about two minutes. Some of the guns on the battery were seen to rife, others to sink, the earth having an undulating motion. Most people were seized with giddiness and sickness, and some fell down; others
At Madrid, the earthquake came on at the same time as at Gibraltar, and lasted about six minutes. At first every body thought they were feized with a swelling in their heads; and afterwards, that the houses were falling. It was not felt in coaches, nor by those who walked on foot, except very slightly; and no accident great deal of mischief.

Malaga (a sea-port on the Mediterranean) felt a violent shock; the bells rung in the steeples; the water of a well overflowed, and as suddenly re-overflowed.

At Seville, (16 leagues above the mouth of the Gualdavir) several houses were shaken down; the famous tower of the cathedral called La Girada opened in the four fides; and the waters were so violently agitated, that all the vessels in the river were driven ashore.

In Africa, the earthquake was felt almost as severely as it had been in Europe. Great part of the town of Algiers was destroyed. At Arzila (a town in the kingdom of Fez), about ten in the morning, the sea sud-denly rose with such impetuosity, that it lifted up a vessel in the bay, and dropped it with such force on the land, that it was broke to pieces; and a boat was found two musket-shot within land from the sea. At Fez and Mequinez, great numbers of houses fell down, and a multitude of people were buried in the ruins.

At Morocco, by the falling down of a great number of houses, many people lost their lives: and about eight leagues from the city the earth opened and swallowed up a village with all the inhabitants, who were known by the name of the Sons of Desemplis, to the number of about 8000 or 10,000 persons, together with all their cattle, &c.; and, soon after, the earth closed again in the same manner as before.

At Salle, a great deal of damage was done. Near a third part of the houses were overthrown; the waters rushed into the city with great rapidity, and left behind them great quantities of fish.

At Tangier, the earthquake began at ten in the morning, and lasted ten or twelve minutes. The sea came up to the walls (a thing never heard of before); and went down immediately with the same rapidity with which it arose, leaving a great quantity of fish behind it. These commotions were repeated 18 times, and lasted till six in the evening.

At Tetuan, the earthquake began at the same time it did at Tangier, but lasted only seven or eight minutes. There were three shocks so extremely violent, that it was feared the whole city would be de-stroyed.

In the city of Pachinal, in the island of Madeira, a shock of this earthquake was first perceived at 38 minutes past nine in the morning. It was preceded by a rumbling noise in the air, like that of empty carriages passing hastily over a stone pavement. The observer felt the floor immediately to move with a tremulous motion, vibrating very quickly. The shock continued more than a minute; during which space, the vibrations, though continual, were weakened and increased in force twice very sensibly. The increase after the first remission of the shock was the most intense. The noise in the air accompanied the shock during the whole of its continuance, and lasted some seconds after the motion of the earth had ceased; dying away like a peal of distant thunder rolling through the air. At three quarters past eleven, the sea, which was quite calm, it being a fine day, and no wind stirring, re- tired suddenly some paces; then rising with a great swell without the least noise, and as suddenly advancing, overflowed the shore, and entered the city. It rose 15 feet perpendicular above the high-water mark, although the tide, which flowed there seven feet, was then at half ebb. The water immediately receded; and after having fluctuated four or five times between high and low water mark, it subsided, and the sea remained calm as before. In the northern part of the island the inundation was more violent, the sea there retiring above 100 paces at first, and suddenly returning, overflowed the shore, forcing open doors, breaking down the walls of several magazines and storehouses, leaving great quantities of fish ashore and in the streets of the village of Machico. All this was the effect of one rising of the sea, for it never afterwards flowed high enough to reach the high-water mark. It continued, however, to fluctuate in the manner described, the effects were dreadful.

On the north, however, we are assured, that the effects were more remarkable. The water of several rivers and lakes were violently agitated. In the latter, shocks were felt in several provinces, and all the rivers and lakes were strongly agitated, especially in Dalecarlia. The river Dala suddenly overflowed its banks, and as suddenly re-tired. At the same time a lake at the distance of a league from it, and which had no manner of communication with it, bubbled up with great violence. At Flahun, a town in Dalecarlia, several strong shocks were felt.

In many places of Germany the effects of the earthquake were very perceptible. Throughout the duchy of Holstein, the waters were violently agitated, particularly those of the Elbe and Trave. In Brandenburg, the water of a lake called Libfep, ebbed and flowed six times in half an hour, with a dreadful noise, the weather being then perfectly calm. The same agitations were observed in the waters of the lakes called Mapoga and Netzo, but at this last place they also emitted an intolerable stench.

In Holland, the agitations were more remarkable.
Earth-quake.

At Alphen on the Rhine between Leyden and Woerden, the afternoon of the 1ist of November, the waters were agitated to such a violent degree, that buoys were broken from their chains, large vessels snapped their cables, smaller ones were thrown out of the water upon the land, and others laying on land were set afloat. At Amsterdam, about eleven in the forenoon, the air being perfectly calm, the waters were suddenly agitated in their canals, so that several boats broke loose; chandeliers were observed to vibrate in the churches; but no motion of the earth, or concussion of any building, was observed. At Haarlem, in the forenoon, for near four minutes together, not only the water in the rivers, canals, &c. but also all kinds of fluids in smaller quantities, as in coolers, tubs, backs, &c. were surprizingly agitated, and dashed over the sides though no motion was perceptible in the vessels themselves. In these small quantities also the fluid apparently ascended prior to its turbulent motion; and in many places, even the rivers and canals rose 12 inches perpendicularly. At Leyden, between half an hour after 10 and 11 in the forenoon, the waters rose suddenly in some of the canals, and made several very sensible undulations, so that the boats were strongly agitated. The same motion was perceived in the water of the backs of two breed houes.

At the island of Corfica, the sea was violently agitated, and most of the rivers of the island overflowed their banks. In the city of Milan in Italy, and throughout that district, shocks were felt. At Turin in Savoy, there was felt a very violent shock. In Switzerland, many rivers turned suddenly muddy without rain. The lake of Neufchateel swelled to the height of near two feet above its natural level for the space of a few hours. An agitation was also perceived in the waters of the lake of Zurich.

At the island of Antigua, there was such a sea without the bar as had not been known in the memory of man; and after it, all the water at the wharfs, which used to be fix feet deep, was not two inches. At Barbadoes, about two in the afternoon, the sea ebbed and flowed in a surprizing manner. It ran over the wharfs and streets into the houses, and continued thus ebbing and flowing till ten at night.

The agitation of the water was perceived in greater numbers of places in Great Britain and Ireland. Accounts of the most remarkable of them follow. At Barlborough in Derbyshire, between 11 and 12 in the forenoon, in a boat house on the west side of a large body of water called Pilsley Dam, lapped to cover at least 30 acres of land, was heard a surprizing and terrible noise; a large swell of water came in a current from the south, and rose two feet on the sloped damhead at the north end of the water. It then subsided; but returned again immediately, though with less violence. The water was thus agitated for three quarters of an hour; but the current grew every time weaker and weaker, till at last it entirely ceased.

At Burbidge in Surry, at half an hour after ten in the morning, the weather being remarkable still, without the least wind, in a canal near 700 feet long and 58 feet broad, with a small spring constantly running through it, a very unusual noise was heard at the east end, and the water there observed to be in great agitation. It railed itself in a heap or ridge in the middle; and this heap extended lengthwise about 30 yards, rising between two or three feet above the usual level. After this, the ridge heeled or vibrated towards the north side of the canal with great force, and flowed above eight feet over the grass walk on that side. On its return back into the canal, it again ridged in the middle, and then heeled with yet greater force to the south side, and flowed over its grass walk. During this latter motion, the bottom on the north side was left dry for several feet. This appearance lasted for above a quarter of an hour, after which the water became smooth and quiet as before. During the whole time, the sand at the bottom was thrown up and mixed with the water; and there was a continual noise like that of water turning a mill.

At Cobham in Surrey, between 10 and 11 o'clock, a person was watering a horse at a pond fed by springs. Whilst the animal was drinking, the water suddenly ran away from him, and moved towards the south with such swiftnes, that the bottom of the pond was left bare. It returned again with such impetuosity, that the man leaped backwards to secure himself from its sudden approach. The ducks were alarmed at the first agitation, and instantly flew all out of the pond.

At Dunfall in Suffolk, the water of a pond rose gradually for several minutes in the form of a pyramid, and fell down like a water-spout. Other ponds in the neighbourhood had a smooth flux and reflux from one end to the other.

Near the city of Durham, about half an hour after ten, a gardener was alarmed by a sudden rushing noise from a pond, as if the head of the pond had been broken down; when casting his eye on the water, he saw it gradually rise up, without any fluctuating motion, till it reached a grate which stood some inches higher than the common water level. After this it subsided, and then swelled again; thus continuing to rise and fall during the space of five or seven minutes, making four or five returns in the space of one minute. The pond was about 40 yards long and 10 broad.

At Early Court, Berks, about 11 o'clock, as a gardener was standing by a fish pond, he felt a violent trembling of the earth, which lasted about a minute. Immediately after, he observed a motion of the water from the south to the north end of the pond, leaving the bottom at the south end altogether dry for about six feet. It then returned, and flowed at the fourth end, rising three feet up the slope bank; and immediately after returned to the north bank, rising there also about three feet. In the time between the flux and reflux, the water swelled up in the middle of the pond, collected in a ridge about 20 inches higher than the level on each side, and boiled like a pot. This agitation from south to north lasted about four minutes.

At Eaton bridge, Kent, in a pond about an acre in size, a dead calm, and no wind stirring, some persons heard a noise, and imagining something had been tumbling in, ran to see what was the matter. On their arrival at the pond, they saw all the water open in the middle, so that they could see a poft a good way down, almost to the bottom. The water in the mean time dashing up over a bank two feet high, and perpendicular to the pond. This was repeated several times with a great noise.
At Youtube, Derbyshire (in the Peak), the over-ener of the lead-mines sitting in his writing-room about 10 o'clock, felt a sudden shock, which very ten-sibly raised him up in his chair, and caused several pieces of plaster to drop from the sides of the room. The roof was so violently shaken, that he imagined the whole of the drift had been falling in. Upon this he immediately ran to see what was the matter, but found every thing in perfect safety.—At this time two miners were employed in carting, or drawing along the drifts of the mines, the ore and other materials to be raised up at the shafts. The drift in which they were working was about 120 yards deep, and the space from one end to the other 50 yards or upwards. The miner at the end of the drift had just loaded his cart, and was drawing it along; but he was suddenly surprised by a shock, which so terrified him, that he immediately quitted his employment, and ran to the west end of the drift to his partner, who was no less terrified than himself. They durst not attempt to climb the shaft, left that should be running in upon them; but while they were confulting what means they should take for their safety, they were surprised by a second shock more violent than the first; which frightened them so much, that they both ran precipitately to the other end of the drift. They then went down to another miner who worked about 12 yards below them. He told them that the violence of the second shock had been so great, that it caused the rocks to grind upon one another. His account was interrupted by a third shock, which, after an interval of four or five minutes, was succeeded by a fourth; and, about the same space of time after, by a fifth; none of which were so violent as the second. They heard after every shock, a loud rumbling in the bowels of the earth, which continued about half a minute, gradually decreasing, or seeming to remove to a greater distance.

At Shireburn castle, Oxfordshire, at a little after ten in the morning, a very strange motion was observed in the water of a moat which encompasies the house. There was a pretty thick fog, not a breath of air, and the surface of the water all over the moat as smooth as a looking-glass, except at one corner where it swelled into a leaff; and from thence the water rushed again succeffively, in a surprising manner. In what manner it began to move is uncertain, as nobody observed the beginning of its motion. The flux and reflux, when seen were quite regular. Every flood began gently; its velocity increased by degrees, when at last it rushed in with great impetuouity till it had attained its full height. Having remained for a little time stationary, it then retired, ebbing gently at first, but afterwards linking a way with great swiftnefs. At every flux, the whole body of water seemed to be violently thrown against the bank; but neither during the time of the flux nor that of the reflux, did there appear even the leaft wrinkle of a wave on the other parts of the moat. Lord Vifcount Parker, who had observed this motion, being defirous to know whether it was universal over the moat, sent a person to the other corner of it, at the same time that he himself observed about 25 yards from him, to examine whether the water moved there or not. He could perceive no motion there, or hardly any; but another, who went to the north-east corner of the moat, diagonally opposite to his lordship, found it as considerable there as where he was. His lordship imagining, that in all probability the water at the corner diagonally opposite to where he was would move that by him, he ordered the person to signify by calling out, when the water was to sink and when to rise. This he did; but, to his lordship’s great surprize, immediately after the water began to rise at his own end, he heard his voice calling that it began to rise with him also; and in the same manner he heard that it was sinking at his end, soon after he perceived it to sink by himself. A pond just below was agitated in a similar manner; but the ripples and sinkings of it happened at different times from those at the pond where lord Parker observed.

At White Rock in Glamorganshire, about two hours ebb of the tide, and near three quarters after six in the evening, a vast quantity of water rushed up with a prodigious noise; floated two large vessels, the leaft of them above 200 tons; broke their moorings, drove them across the river, and had like to have over-fet them. The whole rise and fall of this extraordinary body of water did not last above ten minutes, nor was it felt in any other part of the river, so that it seemed to have guished out of the earth at that place.

At Loch Lomond in Scotland, about half an hour after nine in the morning, all of a sudden, without the least gulf of wind, the water rose against its banks with great rapidity, but immediately subdued, till it was as low in appearance as any body then present had ever seen it in the greatest-summer drought. Instantly it returned towards the shore, and in five minutes time rose again as high as before. The agitation continued at the same rate till 15 minutes after ten the same morning; taking five minutes to rise, and as many to subside. From 15 minutes after 10 till 11, the height of every rise came somewhat short of that immediately preceding, taking five minutes to flow, and as many to ebb, till the water was entirely settled. The greatest perpendicular height of this well was two feet four inches. A still more remarkable phenomenon attending the earthquake in this lake was, that a large stone lying at some distance from shore, but in such shallow water that it could easily be seen, was carried out of its place in the lake upon dry land, leaving a deep furrow in the ground all along the way in which it had moved.

In Loch Nefs, about half an hour after nine, a very great agitation was observed in the water. About the high water of Port Augustus, into the head of the loch, was observed to swell very much, and run upwards from the loch, with a pretty high wave, about two or three feet higher than the ordinary surface. The motion of the wave was against the wind, and it proceeded rapidly for about 200 yards up the river. It then broke on a hallow, and flowed three or four feet on the banks, after which it recurred gently to the loch. It continued ebbing and flowing in this manner for about an hour, without any such remarkable waves as the first; but about 11 o’clock, a wave higher than any of the rest came up, and broke with so much force on the low ground on the north side of the river, that it run upon the grais upwards of 30 feet from the river’s bank.

At Kinfaile, between two and three in the afternoon, in Ireland, the weather being very calm, and the tide near full, a large
large body of water suddenly poured into the harbour with such rapidity, that it broke the cables of two vessels, each moored with two anchors, and of several boats lying between Sicily and the town. But just at the time that a great deal of mischief was apprehended by all the vessels running foul of each other, an eddy whirled them round several times, and then hurried them back again with the same rapidity as before. This was several times repeated; and while the current rushed up at one side of the harbour, it poured down with equal violence at the other. A vessel that lay all this time in the pool did not seem to be any ways affected by it; nor was the violence of the currents much perceived in the deeper parts of the harbour, but raged with most violence on the flats. The bottom of the harbour, which is muddy, was much altered; the mud being washed from some places, and deposited in others. The perpendicular rife of the water at one quay was measured, and found to be five feet and an half; and is said to have been much higher at another, where it overflowed, and poured into the market-place with such rapidity, that some people who were on the quay immediately ran off, and yet could not prevent themselves from being overtaken and immersed knee-deep in the water. The agitation extended several miles up the river; but, as in the harbour, were most perceived in the shallowest places. The successive risings and fallings of the water continued about ten minutes, and then the tide returned to its natural course. Between six and seven in the evening, the water rose again, though not with so great violence as before, and it continued to ebb and flow alternately till three in the morning. The waters did not rise gradually at first; but, with a hollow and horrid noise, rushed in like a deluge, rising six or seven feet in a minute, and as suddenly subsiding. They were as thick as pudding, very black, and stuck intolerably. From different accounts it appeared, that the water was affected in a similar manner all along the coast to the westward of Kinfaile.

In France, shocks were perceived in several places; as at Bayonne, Bourdeaux, and Lyons. Commotions of the waters also were observed at Angouleme, Bleville, Havre de Grace, &c. but not attended with the remarkable circumstances abovementioned. There were the most striking phenomena with which the earthquake of Nov. 1. 1755 was attended on the surface of the earth. Those which happened below ground cannot be known but by the changes observed in springs, &c. which were in many places very remarkable. At Colares, on the afternoon of the 31st of October, the water of a fountain was greatly decreased: on the morning of the first of November it ran very muddy; and, after the earthquake, returned to its usual state both as to quantity and clearness. On the hills, numbers of rocks were split; and there were several rents in the ground, but none considerable. In some places where formerly there had been no water, springs burst forth, which continued to run. Some of the largest mountains in Portugal were impulsively shaken as if it were from their foundation; most of them opened at their fummits, split and rent in a wonderful manner, and huge masses of them were thrown down into the subjoined valleys. From the rock called Pedro de Alvain, near the hill Fojo, a kind of parapet was broken off, which was thrown up from its foundation in the sea. At Varge, on the river Macas, at the time of the earthquake, many springs of water burst forth, some spouted to the height of 18 or 20 feet, throwing up sand of various colours, which remained on the ground. A mountainous point, seven or eight leagues from St Ube's, left afunder, and threw off several vast masses of rock. In Barbary, a large hill was rent in two; the two halves fell different ways, and buried two large towns. In another place, a mountain burst open, and a stream issued from it as red as blood. At Tangier, all the fountains were dried up, so that there was no water to be had till night. A very remarkable change was observed on the medicinal waters of Toplitz, a village in Bohemia famous for its baths. These waters were discovered in the year 792: from which time the principal spring of them had constantly thrown out hot water in the same quantity, and of the same quality. On the morning of the earthquake, between 11 and 12 in the forenoon, the principal spring cast forth such a quantity of water, that in the space of half an hour all the baths ran over. About half an hour before this great increase of the water, the spring flowed turbid and muddy; then having stopped entirely for a minute, it broke forth again with prodigious violence, driving before it a considerable quantity of reddish ochre. After this it became clear, and flowed as pure as before. It still continues to do so; but the water is in greater quantity, and hotter, than before the earthquake. At Angouleme in France, a subterraneous noise like thunder was heard, and presently after the earth opened, and discharged a torrent of water mixed with red sand. Most of the springs in the neighbourhood sunk in such a manner, that for some time they were thought to be quite dry. In Britain, no considerable alteration was observed in the earth, except that, near the lead mine abovementioned in Derbyshire, a cleft was observed about a foot deep, six inches wide, and 150 yards in length.

At sea, the shocks of this earthquake were felt most effectually. Off St Lucar, the captain of the Nancy the earthshook felt his ship violently shaken, that he thought she had touched the ground; but, on hearing the lead, he was in a great depth of water. Captain Clark from Denia, in N. Lat. 36° 24', between nine and ten in the morning, had his ship shaken and strained as if she had struck upon a rock, so that the seams of the deck opened, and the compass was overturned in the binnacle. The matter of a vessel bound to the American islands, being in N. Lat. 25°, W. Long. 40°, and writing in his cabin, heard a violent noise, as he imagined, to the screece; and while he was asking what the matter was, the ship was put into a strange agitation, and seemed as if she had been suddenly jerked up and suspended by a rope fastened to the main-head. He immediately started up with great terror and astonishment; and looking out at the cabin-window, saw land, as he took it to be, at the distance of about a mile. But, coming upon the deck, the land was no more to be seen, but he perceived a violent current crossed the ship's way to the leeward. In about a minute, this current returned with great impetuosity, and at a league's distance he saw three craggy-pointed rocks throwing up water of various colours resembling fire.
This phenomenon, in about two minutes, ended in a black cloud, which ascended very heavily. After it had risen above the horizon, no rocks were to be seen; though the cloud, still ascending, was long visible, the weather being extremely clear. Between nine and ten in the morning, another ship, 40 leagues west of St. Vincent, was so strongly agitated, that the anchors, which were lashed, bounded up, and the men were thrown afoot and an half perpendicularly up from the deck. Immediately after this, the ship sunk in the waters as low as the main chains. The lead showed a great depth of water, and the line was tinged of a yellow colour and finet of sulphur. The shock lasted about ten minutes, but they felt smaller ones for the space of 24 hours.

Such were the phenomena of this very remarkable and destructive earthquake, which extended over a tract of at least four millions of square miles. The earthquakes, however, which in the year 1783 ruined a great part of Italy and Sicily, tho' much more confined in their extent, seem to have been not at all inferior in violence. Sir William Hamilton, who wrote a particular account of their effects, informs us, that "if, on a map of Italy, and with your compass on the scale of Italian miles you were to measure off 22, and then, fixing the central point in the city of Oppido (which seemed to be the spot where the earthquake had exerted its greatest force) form a circle (the radius of which will be 22 miles), you will then include all the towns, villages, &c. that have been utterly ruined, and the spots where the greatest mortality happened, and where there have been the most visible alterations on the face of the earth: then extend your compass on the same scale to 72 miles, preferring the same centre, and form another circle, you will include the whole country that has any mark of having been affected by the earthquake. A gradation was plainly observed in the damage done to the buildings, as above in the degree of mortality, in proportion as the countries were more or less distant from this supposed centre of the evil." Another circumstance was particularly remarked, and in which this earthquake differed very considerably from others, viz. that if two towns were situated at an equal distance from the same centre, one on the hill, the other on the plain or in a bottom, the latter always suffered more by the shocks of the earthquakes than the former.

From the most authentic reports and accounts received by his Sicilian majesty's secretary of state, it was learned that the part of Calabria which had been most affected by this heavy calamity, is that comprehended between the 38th and 39th degree of latitude; that the greatest force of the earthquake seemed to have exerted itself from the foot of those mountains of the Apennines called the Monte Digo, Monte Sacro, and Monte Can­lene, extending westward to the Tyrrhenian sea: that the towns, villages, and farm-houses near these moun­tains, situated either on the hills or the plain, were totally ruined by the shock of the 5th of February about noon: that as the towns and villages were at a greater distance from this centre, the damage they received was less considerable; but that even these more distant towns had been greatly damaged by the subsequent shocks of the earthquakes, and effectually by those of the 7th, 26th, and 28th of February, and that of the 11th of March; that from the first shock of the 5th of February, the earth had been in a continual tremor; and that the shocks were more sensibly felt at times in some parts of the afflicted provinces than at others; that the motion of the earth had been either whirling like a vortex, horizontal, or by pulsations, or by beatings from the bottom upwards. This variety of motions increased the apprehensions of the miserable inhabitants, who expected every moment that the earth would open under their feet, and swallow them up. It was said also that the rains had been continued and violent, frequently accompanied with irregular and furious gusts of wind; and that from all these causes, the face of that part of Calabria comprehended between the 38th and 39th degrees was entirely altered, particularly on the western side of the mountains above-mentioned; that many openings and cracks had been made in those parts; some hills had been much lowered, and others entirely swallowed up; deep chasms had been made, by which many roads were rendered impassable; huge mountains had been said to have been split asunder, and the parts of them driven to a considerable distance; deep valleys had been filled up by the concourse of the mountains which formed them before; the course of rivers altered; many springs of water dried up, and new ones formed in their place, &c. A singular phenomenon was said to have been observed at Laureana in Calabria Ultra; viz. that two whole tenements, with large plantations of olive and mulberry trees, situated in a valley perfectly level, had been detached by the earthquake, and transplanted, with the trees still remaining in their places, to the distance of about a mile from their first situations; and that from the spot on which they formerly stood, hot water had sprung up to a considerable height, mixed with sand of a ferruginous nature: that near this place also some country­men and shepherds had been swallowed up, with their teams of oxen, and their flocks of goats and sheep. The number of lives lost was estimated at 32,367; but Sir William Hamilton is of opinion, that, including strangers, it could not be less than 40,000.

The fate of the inhabitants of Scilla was extremely terrible. The affection. On the first shock of the earthquake February 5th, they had fled along with their prince to the sea-shore, where they hoped for safety: but in the night time a furious wave (said to have been boiling hot, and by which many people were alleged to have been scalced) overflowed the land for three miles, sweeping off in its return 2473 of the inhabitants, among whom was the prince himself, who were at that time either on the strand or in boats near the shore. But the most singular of all the phenomena enumerated in these accounts was, that a hill, about 500 palms in height, and 1500 in circumference at its base, jumped to the distance of about four miles from the place where it formerly stood. At the same time the hill on which the town of Oppido stood, which extended about three miles, parted in two; and as its situation was between two rivers, both of these were of course stopped up; two great lakes were formed, and by their continual increafe threatened to infect the air by their noxious exhalations.

Such were the accounts at first propagated and universally believed; but Sir William Hamilton, who made a tour through the ruined country that same year, examined the
Earthquake.

found that, though the effects in general were very dreadful, fill there had been some exaggeration in several particulars. He felt, for the purpose of making this tour, on the 24th of May, for Naples, and soon landed on the coast of Calabria Citra. The first appearances of the earthquake were observed at Cedraro; some of the principal inhabitants of that city having quitted their habitations, though Sir William could not perceive that any damage had been done. At St Lucido, the baron's palace and the church (which had suffered, and most of the inhabitants were in barracks; but willing to come as soon as possible to the centre of that scene of desolation, he felt ill again, and landed on the 6th of May at the town of Pizzo in Calabria Ultra. This town is situated on a volcanic tosa, and had been greatly damaged by the earthquake of February 5th, but completely ruined by that of the 28th of March. Here he was assured, that the volcano of Stromboli, which is opposite, and in full view of the town, had been greatly damaged by the earthquake of February 4th, but that the town was a general observation also, that before a shock the clouds seemed to be still and motionless, and that immediately after a heavy shower of rain a shock quickly followed. Here Sir William had an opportunity of seeing many people who had been thrown down by the violence of the shocks. Several peasants told him, that the motion of the earth was so violent, that the heads of the largest trees almost touched the ground from side to side; that during a shock, the horses and oxen extended their legs wide apart, that they might not be thrown down; and that they gave evident signs of being sensible of the approach of each shock. "I myself," he says, "have observed, that in those parts which have suffered most by earthquakes, the braying of an ass, the neighing of a horse, or the cackling of a goose, always drove people out of their barracks, and was the occasion of many Pater-nosters and Ave-marias being repeated, in expectation of a shock."

From Pizzo he passed through a most beautiful country to Monteleone. This town, anciently called Vibo Valentia, is finely situated on a hill, overlooking the sea and the fine rich plains through which it had just passed; which are bounded by the Apennines, and crowned by Aspromonte the highest of them all. They were formerly interpersed with towns and villages; but at that time all of them lay in ruins. Monteleone suffered little on the 5th of February, but was greatly damaged on the 28th of March. Here every one agreed, that the shocks of the earthquake seemed to come with a rumbling noise from the westward; beginning usually with the horizontal motion, and ending with the verticose, by which left the greatest part of the buildings in this province were destroyed. It was a general observation also, that before a shock the clouds seemed to be still and motionless, and that immediately after a heavy shower of rain a shock quickly followed. Here Sir William had an opportunity of seeing many people who had been thrown down by the violence of the shocks. Several peasants told him, that the motion of the earth was so violent, that the heads of the largest trees almost touched the ground from side to side; that during a shock, the horses and oxen extended their legs wide apart, that they might not be thrown down; and that they gave evident signs of being sensible of the approach of each shock. "I myself," he says, "have observed, that in those parts which have suffered most by earthquakes, the braying of an ass, the neighing of a horse, or the cackling of a goose, always drove people out of their barracks, and was the occasion of many Pater-nosters and Ave-marias being repeated, in expectation of a shock."

From Monteleone our author descended into the plain, having passed through many towns and villages.
The town of Rosarno, with the duke of Monteleone's palace there, was entirely ruined; but the walls remained about six feet high, and were at that time sitting up as barracks. The only building that remained unhurt at Rosarno was the town gaol, in which were three notorious villains, who would probably have lost their lives if they had remained at liberty.

From Rosarno Sir William proceeded to Laurana, where he was conducted to the place where two tenements were said to have exchanged situations. This fact, which at the first relation appeared incredible, Sir William affirms was true, and very easily accounted for. These tenements were situated in a valley surrounded by high grounds; and the surface of the earth, which was removed, had probably been undermined by little rivulets which come from the mountains, and were then plainly discernible on the bare spot which the tenements had quitted. Their course down the valley was sufficiently rapid to prove that it had not been a perfect level as was represented. The earthquake, he supposes, had opened some depo­ sitaries of rain-water in the clay-hills which surround the valley; which water, mixed with the loose soil, taking its course suddenly through the undermined surface, lifting it up with the large olive and mulberry trees, and a thatched cottage, floated the whole piece of ground, with all its vegetation, about a mile down the valley, where it then flooded with most of the trees erect. These two tenements were about a mile long and half a mile broad. In the neighbourhood were several cracks, none of them above a foot wide; but our author was assured, that during the earthquake they had opened wide, and swallowed up an ox with near 100 goats. In the abovementioned valley he saw the fame fort of hollows in the form of inverted pyramids, out of which he had been assured that hot water mixed with sand filled during the earthquakes as at Rosarno; but, on proper inquiry, no person was found who could positively declare that the water had really been hot. Some of the sand which was thrown up had a ferruginous appearance, and seemed to have been acted upon by fire. It was said also, that, when fresh, this sand had the smell of sulphur; but this our author could not perceive.

Passing through the same beautiful country to the town of Polistena, he did not perceive a single house standing. "I travelled," (says he) "four days in the plain, in the midst of such misery as cannot be described. The force of the earthquake there was so great, that all the inhabitants of the towns were buried, alive or dead, in the ruins of their houses in an instant. The town of Polistena was large, but ill situated between two rivers that were subject to overflow. Two thousand one hundred, out of 6000, lost their lives here on the fatal 5th of February." At Casal Nuova, the princes Gracie Grimaldi, with 4000 of their subjects, perished on the same day by the explosion; for such it appears to have been. Some had been dug alive out of the ruins, told our author, that they had felt their houses fairly lifted up, without having the least previous notice. An inhabitant of Casal Nuova was at that moment on a hill overlooking the plain; when, feeling the shock, and turning round, instead of the town he saw only a thick cloud of white dust like smoke, the natural effect of the crushing of the buildings and the mortar flying off.

The town of Casal Nuova was so effectually destroyed by this dreadful shock, that neither vestige of house or street remained, but all lay in one confused heap of ruins. Castellace and Milicufco, which our author next visited, were both in the same situation. Terra Nuova, situated in the same plain, flood between two rivers, which, with the torrents from the mountains, had, in the course of ages, cut deep and wide chasms in the soft sandy clay of which it is composed. At Terra Nuova the ravine or chasm is not less than 500 feet deep, and three quarters of a mile broad. Here the accounts of the earthquake were confused, by not having the situation of the place and nature of the soil explained. It was said, that a town had been thrown a mile from the place on which it stood, without mentioning a word of the ravine; that woods and corn-fields had been removed in the same manner, "when in truth (says our author) it was but upon a large scale, what we see every day upon a smaller scale, when pieces of the sides of hollow ways, having been undermined by rain waters, are detached by their own weight. Here, from the great depth of the ravine, and the violent motion of the earth, two huge portions of the latter, on which a great part of the town flood, which consisted of some hundred houses, had been detached into the ravine, and nearly across it, at the distance of half a mile from the place where they formerly stood; and which is very extraordinary, many of the inhabitants who had taken this singular leap in their houses, were nevertheless dug out alive, and some unhurt." Our author's guide there, who was both a priest and physician, having been buried in the ruins of his house by the first shock, was blown out of it and delivered by the second, which immediately followed the first; and there were many well attested instances of the same thing happening in different parts of Calabria. At Terra Nuova, however, only 400 out of 1600 inhabitants were left alive.

In other parts of the plain, situated near the ravine, great and near the town of Terra Nuova, our author saw traces of many acres of land, with trees and corn-fields, that had been detached into the ravine, frequently without having been overturned; so that the crops were growing as well as if they had been planted there. Other pieces were lying in the bottom in an inclined situation, and others again that had been quite overturned. In one place, two of these immense pieces of land having been detached, opposite to one another, had filled the valley, and stopped the course of the river, the waters of which were forming a great lake; "and this (says our author) is the true state of what the accounts mention of mountains that had walked, and joined together, stopped the course of a river, and formed a lake."

At the moment of the earthquake the river disappeared as at Rosarno; and returning soon after, overflowed the bottom of the ravine about three feet in depth; so that the poor people who had been thrown with their houses into the ravine from the top of it, and had escaped with broken bones, were now in danger of being drowned. Our author was affured, that the water was felt like that of the sea; but this circumstance
Earthquake. 

63 Watermills raised up to an elevated situation.

53 In the plain, near the spots where the abovementioned pieces had been detached into the ravine, there were several parallel cracks; so that, had the violence of the earthquake continued, these pieces would probably have followed. It was constantly remarked by our author, that near every ravine or hollow way, the parts of the plain adjoining were full of large parallel cracks. The earth rocking from side to side, and being supported only on one side, accounts very well for this circumstance.

46 Sinking in the earth, why generally formed near ravines.

52 The enormous masses of the plain, detached from each side of the ravine, lie sometimes in confused heaps, forming real mountains, and having flopped the course of two rivers (one of which is very considerable), great lakes are already formed; and if not affiliated by nature or art, as to give the rivers their due course, must infallibly be the subject of future  

47 A country-man detached with a great tract of land across a ravine.

57 From Oppido Sir William proceeded to the towns of Seminara and Palmi. The former, being situated

58 Mountains and lakes formed by the earthquake.
higher up, had suffered less than Palmi which stood nearer the sea. Fourteen hundred lives were lost at this place, and some singular circumstances occurred. The town being a great market for oil, there were upwards of 4000 barrels of that liquid in it at the time of its destruction; so that the breaking of these barrels and jars, a rivulet of oil ran from the ruins for many hours into the sea. Here our author was informed by the person who conducted him, that he had been buried in the ruins of his house by the first shock; and that after the second, which followed immediately, he found himself fitting a blade at least 15 feet high in the air. After Sir William's departure from Palmi, in going through one of the narrow passes among the mountains of Baghara and Solano, he felt a very smart shock of an earthquake attended with a loud explosion like that of springing a mine; but fortunately it did not detach any rocks or trees from the high mountains which hung over their heads. In this country he was assured by several fiders, that during the earthquake on the 3d of February, at night, the sea was hot, and that they saw fire issue from the earth in many parts. This last circumstance was frequently repeated in different parts of the plain, so that there seems to remain no doubt of its authenticity.

The idea of Sir William Hamilton is, that "the exhalations which issued during the violent commotions of the earth were full of electrical fire; just as the stove of volcanoes continuously is during violent eruptions; for I saw no mark (says he), in any part of my journey, of any volcanic matter having issued from the fissures of the earth; and I am convinced that the whole has been done by vapours and exhalations only. The first shock felt at this place, as I was assured, was lateral, and then verticle, and exceedingly violent; but what they call violent here must have been nothing in comparison of what was felt in the plain of Cafa Nova, Polifente, Palmi, Terra Nova, Oppido, &c. &c. where all agreed that the violence of the fatal shock of February was incontinent, without warning, and from the bottom upwards." At Reggio the shock had been much less violent than in the places hitherto visited by our author; and though there was not a house in it inhabited or habitable, yet (says he) after having been several days in the plain, where every building is levelled with the ground, a house with a roof, or a church with a beam, was to me a new and refreshing object." In this place he had an account from the archbishop of the earthquakes of 1770 and 1780, which obliged the inhabitants, in number 16,400, to encamp or remain in barrack for several months, without having done any considerable damage to the town. He was informed also, that all animals and birds are in a greater or lesser degree much more sensible of an approaching shock of an earthquake than any human being; but that geese, above all, seem to be the foonest and most alarmed at the approach of a shock: if in the water, they quit it immediately; and there are no means of driving them into it for some time after. The shock which damaged Reggio came on gently, so that the people had time to make their escape, and only 126 were killed; but in the plain this shock was as instantaneous as it was violent and destructive.

On the 14th of May, Sir William Hamilton having taken leave of Reggio, set sail for Messina, which he visited next morning; and found that the shock, tho' very violent there, had been far inferior to what he had seen the effects of in other places. Many houses even in the lower part of the town, were standing, and some little damaged; but in the upper and more elevated situations, the earthquakes seemed to have scarcely had any effect. "A strong instance (says our author) of this, is that the convent of Santa Barbara, and that called the Noostato di Glicchi, both on an elevated situation, have not a crack in them; and that the clock of the latter has not been deranged in the least by the earthquakes, which have afflicted this country for four months past, and which still continue in some degree."

Notwithstanding this comparative mildness, however, the shock at Messina had been very terrible. All it there the beautiful front of the palazzate, which extended in very lofty uniform buildings, in the shape of a crescent, had been in some parts totally ruined, in others least; and there were cracks in the earth of the quays, a part of which had sunk above a foot below the level of the sea. These cracks were probably occasioned by the horizontal motion of the earth in the same manner as the pieces of the plain were detached into the ravines at Oppido and Terra Nuova; for the sea at the edge of the quay is so very deep, that the largest ships can lie along side. The earth, therefore, in its violent commotion, wanting support on that side next the sea, began to crack and separate; and as where there is one crack there are generally others less considerable in lines parallel to the first, our author supposes, that the great damage done to the houses near the quay was owing to such cracks below their foundations. It is said, that during the earthquake fire had been seen to issue from the cracks of the quay; but our author is persuaded, that this, as in other cafes, was only a vapour charged with electrical fire or a kind of inflammable air. Here also he was informed, that the shock of the 5th of February had been from the bottom upwards; but the subsequent ones generally horizontal or verticle. A remarkable circumstance was observed at Messina, and throughout the whole coast of Calabria, which had been most affected by the earthquake, viz. that a small fish called sicirla, resembling the English white bait, but larger, and which usually lie at the bottom of the sea buried in the sand, had, ever after the commencement of the earthquakes to the time this account was written, continued to be taken near the surface, and that in such abundance as to be common food for the poorest sort of people; whereas before the earthquakes this fish was rare, and reckoned among the greatest delicacies. Fish of all kinds also were taken in greater abundance on these coasts after the commencement of the earthquakes than before; which our author supposes to have been occasioned either by the volcanic matter having heated the bottom of the sea, or that the continual tremor of the earth had forced them out of their retreats. At Messina our author was likewise informed, that on the 5th of February, and for three days following, the sea about a quarter of a mile from the citadel rose and boiled in an extraordinary manner, and with a most horrid and alarming noise; the water in some parts of the strait being perfectly calm. "This says Messina,
Earthquake.

The next inquiry made by this curious traveller was concerning the great wave which occasioned such destruction at Scilla, as has already been related. Having left Messina on the 17th of May, he proceeded in his boat to the entrance of the Faro, where he met with a priest who had been there on the night between the 5th and 6th of February, when the wave passed over that point of land. Here it carried off boats with 24 people, tore up trees by the roots, and left a consider­able quantity of it behind it. This priest had himself been covered by the wave, and with difficulty saved his life. He at first said the water was hot; but on being pressed with other questions, it amounted to no more than that the water was as warm as it usually is in summer. The wave, he said, rose to a great height, and came on with noise and such rapidity that it was impossible to escape.

On crossing over to Scilla, Sir William was perfectly satisfied concerning the nature of this formidable wave, and found that the following was the true state of the fact: "The prince of Scilla having remarked, that during the first horrid shock, which happened about noon the fifth of February, part of a rock near Scilla had been detached into the sea; and fearing that the rock of Scilla, on which his town and castle are situated, might also be detached, he thought it safer to prepare boats, and retire to a little port or beach seated at the foot of it, and likewise surrounded by rocks. But the second shock of the earthquake about midnight, having detached a whole mountain much higher than that of Scilla, situated between the latter and the Torre del Cavallo, it fell into the sea with such violence as to raise the fatal wave abovementioned. This having broken on the point of land called Punto del Faro, in the manner already related, instantly returned with great noise and velocity upon the beach, where the unfortunate prince and his subjects had taken refuge, and either dashed them with their boats and effects against the rocks, or whirled them into the sea. Those who had escaped the first and greatest wave, were carried off by a second and third less considerable, but which immediately followed the first. Our author speaks with many who had been involved in that wave, and violently hurt by it; but all of them agreed in asserting that the water was not hot.

The earthquakes were not perfectly settled even in 1784, when Sir William Hamilton wrote the account of the state of Vesuvius, &c. to the Royal Society. In a postscript to that letter he adds the following confirmation of his conjecture, that the volcanic matter, which he supposed to have occasioned the earthquakes, had vented itself at the bottom of the sea between Calabria and Sicily. "The plot of one of his Sicilian majesty's fiabqueaces having some time after the earthquakes cast anchor off the point of Palizzi, where he had often anchored in 25 fathom water, found no bottom till he came to 65; and having found for two miles out at sea towards the point of Spartivento in Calabria, he still found the water 43,528 fathoms below the surface of the earth, air is but one-fourth lighter than mercury. Now, this depth of 43,528 fathoms is only
only a 74th part of the semidiameter of the earth; and the vault sphere beyond this depth, in diameter 6,451,538 fathoms, may probably be only filled with air, which, if from a heat, be here greatly condensed, and much heavier than the heaviest bodies we know of in nature. But it is found by experiment, that the more air is compressed, the more does the same degree of heat increase its spring, and the more capable does it render it of a violent effect; and that, for instance, the degree of heat of boiling water increases the spring of the air above what it has in its natural state, in our climate, by a quantity equal to a third of the weight wherewith it is prefixed. Whence we may conclude, that a degree of heat, which on the surface of the earth will only have a moderate effect, may be capable of a very violent one below. And as we are assured, that there are in nature degrees of heat much more considerable than that of boiling water, it is very possible there may be none, whose violence, further affected by the exceeding weight of the air, may be more than sufficient to break and overturn this solid orb of earth, the base of which is 50 miles in diameter, and the axis 15 or 20; an effect impossible to any natural power whatever, except electricity. So in Alia Minor, such a cone must have been 200 miles in the diameter of the base, and 200 in the axis; which not all the gun-power that has been made since the invention of it, much less any vapours generated so far below the surface, could possibly effect.

4. That any subterraneous power sufficient to move 30 miles in diameter, as in the earthquake which happened at London, must be lodged at least 15 or 20 miles below the surface; and therefore must move an inverted cone of solid earth, the base of which is 50 miles in diameter, and the axis 15 or 20; an effect impossible to any natural power whatever, except electricity. So in Alia Minor, such a cone must have been 200 miles in the diameter of the base, and 200 in the axis; which not all the gun-power that has been made since the invention of it, much less any vapours generated so far below the surface, could possibly effect.

5. A subterraneous explosion will not account for the manner in which ships, far from land, are affected during an earthquake; which seems as if they struck upon a rock, or as if something thumped against their bottoms. Even the fishes are affected. A subterraneous explosion would only produce a gradual swell, and not give so quick an impulse to the water as would make it feel like a storm.

From comparing these circumstances, the Doctor Hume had says, he had always thought that an earthquake was a quick effect of the same kind as those which commonly occur for, in electrical experiments. And this hypothesis was confirmed by the phenomena attending earthquakes, particularly those of 1749 and 1750, which gave rise to his publication.

The weather, for five or six months before, had been uncommonly warm; the wind south and south-west, without rain; so that the earth must have been in a state peculiarly ready for an electrical shock. The flat country of Lincolnshire had been under an exceedingly great drought. The uncommonness of the first of these circumstances, he remarks, is the reason why earthquakes are less frequently experienced in the northern than in the southern regions of the world, where the warmth and dryness of the air, so necessary to electricity, are more usual: And the latter shows how fit the dry surface was for an electrical vibration; and (which is of great importance) that earthquakes reach but little below the surface of the earth.

Before the earthquake at London, all vegetables had been uncommonly forward. And electricity is well known to quicken vegetation. The aurora borealis had been frequent about that time; and just before the earthquake, had been twice repeated in such colours as had never been seen before. It had also removed louterly, contrary to what is common in England; so that the Italians, and those among whom earthquakes were frequent, actually foretold the earthquake. The year had been remarkable for fire-balls, lightnings, and coruscations; and these are rightly judged to be meteors of an electrical nature.

In plications and eruptions, were the cause of earthquakes, they would absolutely ruin the whole system of springs and fountains, wherever they had once been; which is contrary to fact, even when they have been frequently repeated. Even in the earthquake in Alia Minor, A. D. 17, which destroyed 13 great cities, and shook a mass of earth 300 miles in diameter, nothing suffered but the cities; neither the springs nor the face of the country being injured, which indeed remains the fame to this day.

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Earthquake.  
In these circumstances of the earth and air, nothing, he says, is wanting to produce an earthquake, but the touch of some non-electric body; which must necessarily be ab extra from the region of the air or atmosphere. Hence he infers, that if a non-electric cloud discharge its contents upon any part of the earth, in that highly electrical state, an earthquake must necessarily ensue. As the discharge from an excited tube produces a commotion in the human body, so the discharge of electric matter from the compass of many miles of solid earth must needs be an earthquake; and the snap from the contact, the horrid uncouth noise attending it.

The Doctor had been informed by those who were up and abroad the night preceding the earthquake, and early in the morning, that coruscations in the air were extremely frequent; and that a little before the earthquake, a large and black cloud suddenly covered the atmosphere, which probably occasioned the shock.

A found was observed to roll from the Thames towards Temple Bar before the houses ceased to nod, just as the electrical snap precedes the shock. This noise (which generally precedes earthquakes) the Doctor thought could be accounted for only on electrical principles: for, in a subterraneous eruption, the direct contrary would happen.

The flames and fulphureous smels, which are sometimes observed in earthquakes, might, he thought, be more easily accounted for, on the supposition of their being electrical phenomena, than from their being occasioned by eruptions from the bowels of the earth. So also the suddenness and expedition of the concussion, it being felt at the same instant over such a large surface, and the little damage also which earthquakes generally occasion; sufficiently point out what sort of a motion it is: not a convulsion of the bowels of the earth; but an uniform vibration along its surface, like that of a musical string, or a glass when rubbed on the edge with one's finger.

The circumstance of earthquakes chiefly affecting the sea-coast, places along rivers (and, adds Doctor Prieiifley, eminences), is a farther argument of their being electrical phenomena. This is illustrated by a particular account of the direction in which the earthquake was conveyed.

The last argument he uses is taken from the effects which it had on perons of weak constitutions, who were, for a day or two after it happened, troubled with pains in the back, rheumatism, hysteries, and nervous disorders; just in the same manner as they would have been after an actual electrification; to some these disorders proved fatal.

As to the manner in which the earth and atmosphere are put into this state, which prepares them to receive such a shock, and whence the electric matter comes, the Doctor does not pretend to determine; but thinks it as difficult to be accounted for as magnetism, gravitation, and many other secrets of nature.

The same hypothesis was advanced by Signior Bec- caria, without knowing anything of Dr Stukeley's discoveries. But this learned Italian imagined the electric matter which occasions earthquakes to be lodged deep in the bowels of the earth, agreeably to his hypothesis concerning lightning.

Now, as it appears that the quantity of electric matter in the simplest thunder-forms is so inconceivably great, that it is impossible to be contained by any cloud or number of clouds; and as, during the progress of a thunder-form which he observed, though the lightning frequently struck to the earth, the same clouds were the next moment ready to make a still greater discharge; it was evident, that they must have received at one place, the moment a discharge was made from them in another. Let us suppose these clouds ever so great, if the lightning proceeded only from them, the quantity must be lessened by every discharge; and no reverts that any new clouds might bring can bear any proportion to the discharge which must ensue from the collision of so great a number as combine to form a thunder-form. It seems therefore most likely, that the electric matter is continually darrning from the clouds in one place, at the same time that it is discharged from the earth in another; and, consequently, that the clouds serve as conductors to convey the electric fluid from those places of the earth which are overloaded with it, to those which are exhausted.

This theory being admitted, there will, he thinks, be little difficulty in attributing earthquakes to the same cause. For if the equilibrium of the electric matter be by any means lost in the bowels of the earth, so that the best method of restoring it shall be by the fluid bursting into the air, and traversing several miles of the atmosphere, to come at the place where it is wanted; it may be easily imagined, that violent concussions will be given to the earth by the sudden passage of so powerful an agent. This, in his opinion, was confirmed by the flashes of light, exactly resembling lightning, which have been frequently seen to rush from the top of Mount Vesuvius, at the time that ashes and other light matters have been carried out of it into the air, and dispersed uniformly over a large tract of country. And it is well known, that volcanoes have a near connection with earthquakes.

A rumbling noise like thunder, and flashes of light rising from the ground, have been generally observed to attend earthquakes. And lightning itself has been known to be attended with smail flakings of the earth. So also ignes fatui, in mines, he looked upon as an argument that the electric fluid was sometimes collected in the bowels of the earth.

Dr Prieiifley, in his History of Electricity, observes of Dr upon these theories, that a more probable hypothesis Prieiifley may perhaps be formed out of both of them. "Suppose (says he) the electric matter to be, some way or other, accumulated on one part of the surface of the earth, and on account of the dryness of the season not easily to diffuse itself; it may, as Signior Beccaria supposes, force its way into the higher regions of the air, forming clouds in its passage out of the vapours which float in the atmosphere, and occasion a sudden shower, which may further promote the passage of the fluid. The whole surface, thus unloaded, will receive a concussion, like any other conducting substance, on parting with, or receiving a quantity of the electric fluid. The ruffling noise will likewise sweep over the
of all the earthquakes, though somewhat differing from one another, yet agree in the main; but if a particular solution of the phenomena is required, every one of them will be found deficient.

If, according to Dr Stukeley's hypothesis, the electrical matter is lodged only on the surface of the earth, or but a small depth below, how are we to account for the violent effects which often take place in the bowels of the earth? In the earthquake at Lisbon, a large quay sunk to an unfathomable depth. We are certain that the cause of the earthquake must have been below this depth, however great it was, and have opened the earth for an immense way downwards. At the same time an hill in Barbary clave asunder, and the two halves of it fell different ways. This shows, that the cause of the earthquake operated not on the surface of the hill, but on the solid foundation and contents of it; nor can it be explained by any superficial action whatever. From what the miners at Eyam bridge in Derbyshire observed, it is also evident, that the shock was felt at the depth of 396 feet below the surface of the ground more than at the surface itself; and consequently there is all the reason in the world to think that the cause lay at a depth vastly greater.

Again, though the earthquake at London was supposed to begin with a black cloud and shower; yet in that of 1755, the effects of which were incomparably greater, the air was calm and serene almost in every place where it was felt. It doth not appear that there is at any time a considerable difference between the electrification of the atmosphere and that of the earth, or indeed that there can be so. For if the earth is electrified plus and the atmosphere minus, there are innumerable points on the surface of the earth which must be imperceptibly drawing off the superfluous electrical matter into the air. The vapours also, with which the atmosphere abounds, would always be ready in the same service; and thus thunder and lightning might indeed sometimes be produced, but do not earthquakes. But lastly, neither the air nor the earth does always show any remarkable signs of electrification before earthquakes happen. For, the summer before the earthquake at Manchester in 1777, there had scarce been any thunder, lightning, or other signs of electrification in the atmosphere, and vegetation had been extremely backward; and, according to the best accounts, the weather continued remarkably fine. For these reasons, Dr Stukeley's hypothesis seems to be unsatisfactory. That of Signior Beccaria is not indeed liable to the abovementioned objections; but seems highly improbable on another account. The atmosphere is known to be a substance through which the electric matter makes its way with the utmost difficulty. It is a vastly worse conductor than water or than moist earth. If therefore the equilibrium of this fluid is lost in the bowels of the earth, it is impossible to give a reason why it should not rather go to the places where it is wanted through the earth itself, than through the atmosphere. Besides, if this was the case, the shock of an earthquake could only be felt at those places where the electric fluid issued from the earth, and where it entered. All the intermediate places ought to be free from any shock, and to be sensible only of a violent concussion in the atmosphere; but of this we have no example in any history of earthquakes whatever.

Dr Priesley's hypothesis is liable to the same objections as that of Dr Stukeley; for any superficial operation will never account for those effects abovementioned, which take place at great depths below the surface. His experiment cannot be admitted in any way conclusive with regard to the cause of earthquakes, because no quantity of electric fire is seen to pass over the...
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the earth and sea, like the flash attending the explosion of an electric battery; and the force of its earthquake (being but just able to throw down a stick that could hardly stand by itself) seems by far too little. The utmost force of electricity which man can raise, is indeed very trifling, when compared with the great operations of nature: but it is certain, that the force of an electric battery is by no means contemptible; and was its whole power to be employed in producing an imitation of an earthquake, it certainly would do much more than throw down a small stick. The bad success of this experiment therefore shews, that the Doctor's theory is erroneous: for almost the whole of his electric power was spent another way; and we cannot suppose that any considerable part of the force which produces earthquakes is spent any other way than in the very production of the earthquake itself.

8. Principles on which the phenomena may be explained.

If it is attempted to give an explanation of the phenomena of earthquakes, which shall be free from the objections above mentioned, and from all others, it will be necessary, in the first place, to consider those parts of the system of nature which seem to be most affected during the terrible phenomena we treat of. These parts are, the air, the solid earth, and the water. Of these the two former are electrics per se; the latter is a conductor, though a bad one. Hence it follows, that whatsoever quantity of electricity is communicated to the solid earth, will be quickly taken off from it by the water which is mixed with it, in the same manner that the electric matter is carried off from an excited globe by a metallic conductor.

3. The whole earth is moist, and therefore in some degree a conductor. Nevertheless, as earth of all kinds, when perfectly dry, is found to be an electrically capable of receiving a charge like glass, it is therefore possible, that the electric power of the earth may be excited to such a degree, that the moisture of the solid parts cannot easily contain the quantity of electricity communicated.

4. In this case, the earth must either give undoubted signs of its being excited in the same manner that other excited electrics do, or the electricity must be discharged somewhere else.

5. To receive any superfluous quantity of electric matter that may be communicated to the solid earth, the waters of the ocean are always ready. These, being a much better conductor than earth, must be a principal means of preserving the equilibrium of electricity in the different parts of the earth; and hence we feel a natural reason why the waters of the ocean should cover so large a proportion of the globe as they are known to do. See Ocean.

6. It is known, that fire is also a conductor of electricity. Therefore, wherever a quantity of electric matter is collected in any part of the solid earth, if it can neither be conveniently received by the moisture which the earth naturally contains, nor by the ocean in its neighbourhood, it will discharge itself by any volcano that happens to be in an active state, near the place where that collection of electric matter is.

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7. It is also found, that the electric fluid, being violently refitted by the superincumbent atmosphere, hath always a tendency to discharge itself in those places where that resistance is least. The tops of high mountains, therefore, where the weight of the atmosphere is greatly diminished, will also afford a ready passage for the electric fluid when it is collected in very great quantity in the bowels of the earth.

8. If, from some natural causes, the electric matter shall happen to be collected in the bowels of the earth in any particular place, and at the same time such obstacles are thrown in its way, that it can neither discharge itself into the ocean, nor into the atmosphere by the tops of high mountains, nor by the more open passages of volcanoes; the most terrible consequences must ensue: the matter being pent up, and the cause by which it is collected continuing still to act, its impulse becomes at last irresistible. It then flies against every obstacle with inconceivable violence. It breaks out in all those places where there is the least restraint, and therefore the shock is directed a great number of different ways at once. Houses, trees, trees, &c. by their height take off somewhat of the prejudice of the atmosphere; and therefore the electric matter flies against them very violently. The houses and other buildings being bad conductors, are thrown down; the trees affording a ready passage to the fluid are not hurt, though even they also are sometimes split. The height of the mountains renders them the objects of the destructive force of this fluid much more than any buildings whatever. Hence they are often rent, and rocks thrown down from them. The water contained in the solid parts of the earth, being a conductor of electricity, becomes overloaded with it; and when it can receive no more, is forced to yield to the impulse of the rest, and therefore is thrown out of the earth in great quantities. For the same reason, the waters on the surface of the earth are most violently agitated. The small quantities contained in wells are thrown out at the tops of them: The rivers and lakes, which contain too great a quantity of water to be thrown off from the earth, rife in billows: The ocean itself, receiving more electric matter than can be immediately dispersed through the whole body of water, or evaporated into the atmosphere, retreats from the land, and is raised in vast mountains. The solid earth, being unable either to conduct the fluid quietly to those parts where it is wanted, or to retain it, is violently shaken or rent in multitudes of places; and this not only on the surface, but to great depths. The electricity being now in some measure discharged from the earth, the ocean rushes forward with fury to discharge in its turn the excess of electric matter it just before received from the earth. If there are volcanoes in the neighbourhood, the violent discharge of electricity is sure to manifest itself by setting them in a flame; and thus, till the equilibrium is restored, all nature seems to be threatened with dissolution. Even in those places where the force of the electric fluid is not able to shake the solid parts of the earth, it manifests its power by agitating the waters in the manner above described. Water being a much better conductor of electricity than earth, this subtile fluid, as soon as it can get out from the solid earth, flies to the water. The consequence is, that the water immediately swells up, and
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is attracted by whatever part of the earth has less electricity than itself. Hence those strange irregular motions of the waters in different places, so particularly observed at the time of the earthquake at Lisbon; and which it seems impossible to account for from any other cause than an immediate discharge of electric matter from the earth into them.

9. As it is impossible that any part of the earth can be electrified without communicating a proportionable share of electricity to the animals that live upon it, and have a constant communication with it, it thence follows, that there can be no confiderable commotion in the electric matter lodged in the bowels of the earth, without affecting that which is contained in the bodies of the animals. Hence the brutes, who seem to be more sensible of such commotions than we, run about, and show signs of fear, before the earthquake comes on; and hence the giddiness, sickness, &c. which the human race are subject to during the time of the shock, even though they do not feel it, as was the case at Gibraltar.

10. As the atmosphere hath a communication with the earth, it is scarce to be supposed that the earth can, for any length of time, contain a considerable quantity of electric matter, without communicating to the atmosphere a proportionable quantity. Before an earthquake, therefore, we must suppose the electricity of the earth and air to be in perfect equilibrio. Hence the weather is serene, there is no wind, nor showers of rain, and hence the giddiness, sickness, &c. which are so general in such an earthquake. That this is the case, seems highly probable from an experiment of M. de Romas.

In a stormy day, he placed a kite on the top of a mountain, and when he was at a considerable distance from it, he could hear the noise it made in the air, like the continual blowing of a small forge bellows. In general, a considerable change of weather takes place at the time of an earthquake, though not always. In the earthquake which happened in England in 1777, there was no remarkable change of weather; but, soon after, there was a great deal of thunder and lightning in the southern parts of Scotland; which seems to indicate, that the electric fluid discharged from the earth in England had taken its course northward, and produced the phenomena beforementioned in Scotland. The same observation may likewise be made with regard to 1789, when there were frightful shocks of an earthquake both in England and Scotland. That is more likely the case, for the southward being the first, was followed by an uncommon frequency of thunder and lightning in the southern parts of Scotland; by reason of the progress of the electric matter northward after it was discharged into the atmosphere: but the shocks which happened in the northern part of Scotland (viz. about Crief in Perthshire) were not followed by any thunder to the southward; because the electric matter, though dis-

charged into the atmosphere, cannot return to the earth without first going north, and rising up into the higher regions.

In the earthquakes in Calabria, in the year 1783, there were some circumstances which seem to militate against the theory just now laid down. The most remarkable of these is their attacking the places situated on the plain much more than those which flood on the higher grounds. This is particularly insinuated upon by Sir William Hamilton. “If two towns (says he,) were situated at an equal distance from the centre of the force of the earthquake), the one on a hill, the other on the plain or in a bottom, the latter always suffered greatly more from the shocks of the earthquake than the former; a sufficient proof to me of the cause coming from beneath, as this must naturally have been productive of such an effect. And I have reason to believe, that the bottom of the sea, being still nearer the volcanic cause, would be found, if it could be seen, to have suffered still more than the plain itself: but the philosophers, who do not easily abandon their ancient systems, make the present earthquakes to proceed from the high mountains of the Apennines that divide Calabria Ultra, such as the Monte Dejo, Monte Caulone, and Afpromonte. I would ask them this simple question, Did the Eolian or Lipari islands (all which rose undoubtably from the bottom of the sea by volcanic explosions, at different periods), and, perhaps, very distant periods, owe their birth to the Apennines in Calabria, or to veins of minerals in the bowels of the earth and under the bottom of the sea? Stromboli, an active volcano, and probably the youngest of those islands, is not above 50 miles from those parts of Calabria that have suffered most by the late earthquakes. The vertical shocks, or, in other words, those whose impulse was from the bottom upwards, have been the most destructive to the unhappy towns in the plain. Did they proceed from Monte Dejo, Monte Caulone, or Afpromonte? In short, the idea I have of the present local earthquakes is, that they have been caused by the same kind of matter that gave birth to the Eolian islands; that perhaps an opening may have been made at the bottom of the sea, and more to the bottom of a kind of sea without bottom, like the Stromboli and Calabria Ultra; for from that quarter all agree that the subterraneous noises seem to have proceeded; and that the foundation of a new island or volcano may have been laid, though it may be ages, which to nature are but moments, before it is completed and appears above the surface of the sea. Perhaps, too, the whole destruction I have been describing may have proceeded simply from the exhalations of confined vapours generated by the fermentation of such minerals as produce volcanoes, which have escaped where they meet with the least resistance, and must naturally, in a greater degree, have affected the plain than the high and solid grounds around it.”

In a memoir on this earthquake by M. Dolomieu, Electricity, that author endeavours to exclude electricity from having any share in the matter. “The sea (says he,) during the earthquakes of 1783, had little share in the shocks of the main land. The mafs of water experienced no general movement or fluctuation or oscillation; the waves did not rise above their ordinary limits. Those which, on the night of the 5th of Feb., quakes, brassy, beat against the coast of Sicily, and which afterwards,
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Towards covered the point of the Faro of Messina, were only the effects of a particular cause. The fall of a mountain into the sea raised the waters, which received an undulating motion, as happens always in similar cases. The undulation reached from the point of Sicily beyond the Cape of Rofacolmo, extending in length along the coast which runs to the south, but always with a decrease in elevation as it was more remote from Sicily. Whatever inquiries the author has made, he has not been able to discover, in all the details which have been given him, any proofs of the existence of electrical phenomena; no spark, no disengagement of the electrical fluid, which the Neapolitan naturalists wish to affign as the cause of earthquakes.

87 Of the state of the atmosphere.

"The state of the atmosphere was not the same in the whole range of earthquakes. While the tempests and the rain seemed to have conspired with them for the destruction of Messina, the interior part of Calabria enjoyed very fine weather. A little rain fell in the plain in the morning of the 5th of February; but the sky was clear during the rest of the day. This month and the first of March were not only pretty free from rain, but the natural attendants of the season."

"The moving force seems to have resided under Calabria itself, since the sea which surrounds it had no share in the oscillations or vibrations of the continent. This force seems also to have advanced along the ridge of the Apennines in ascending from the south to the north. But what power in nature is capable of producing such effects? I exclude electricity, which cannot accumulate continually during the course of a year, in a country surrounded with water, where every thing conspires to place this fluid in equilibrio. Fire remains to be considered. This element, by acting directly upon the solids, can only dilate them; then their expansion is progressive, and cannot produce violent and instantaneous movements. When fire acts upon fluids, such as air and water, it gives them an astonishing expansion; and we know that then their elastic force is capable of overcoming the greatest resistances. These appear the only means which nature could employ to operate the effects we speak of; but in all Calabria there is no vestige of a volcano; nothing to point out any interior combustion; no fire concealed in the centre of mountains, or under their base; a fire which could not exift without some external signs. The vapours diluted, the air rarefied, by a heat constantly active, must have escaped through some of the crevices or vents formed in the foil; they must there have formed currents. Both flame and smoke must have issued by some one or other of these passages. These once opened, the pressure would have ceased; the force not meeting with any more resistance, would have lost its effect; and the earthquakes could have no longer continued. None of these phenomena took place: we must then renounce the supposition of a combustion acting directly under Calabria. Let us see if having recourse to a fire at some distance from this province, and acting upon it only as an occasional cause, we shall be able to explain all the phenomena which have accompanied the shocks. Let us take for example Etna in Sicily, and suppose large cavities under the mountains of Calabria; a supposition which cannot be refuted. It is certain that immense subterraneaus cavities do exist, since Etna, in elevating itself by the accumulation of its explosive, must leave in the heart of the earth cavities proportioned to its greatness of the mass.

The autumn of 1782 and the winter of 1783 were very rainy. The interior waters, augmented by those of the surface, may have run into those caverns which form the focus of Etna: there they must have been converted into vapour capable of the highest degree of expansion, and must have pressed forcibly against every thing which opposed their dilatation. If they found canals to conduct them into the cavities of Calabria, they could not fail to occasion there all the calamities of which I have given the description.

"If the first cavity is separated from the second by a wall (to speak) or some slight division, and this separation is broken down by the force of the elastic vapour, the whole force will act against the bottom and sides of the second. The focus of the shocks will appear to have changed place, and become weaker in the space which was agitated most violently by the first earthquake."

"The plain, which was undoubtedly the most lessen part of the vault, yielded most easily. The city of Messina, placed upon low ground, experienced a shock which the buildings on higher grounds did not. The moving force ceased at once as suddenly as it acted violently. When, at the periods of the 7th of February and the 28th of March, the focus appeared changed, the plain fcarce suffered any thing. The subterranean noise, which preceded and accompanied the shocks, appeared always to come from the south-west, in the direction of Messina. It seemed like thunder under ground, which rebounded beneath vaults."

"If Etna, then, has been the occasional cause of the earthquakes, it has also prepared, for some time, the misfortunes of Calabria, by gradually opening a passage along the coast of Sicily to the foot of the Neptunian mountains: for during the earthquakes of 1780, which disturbed Messina the whole summer, they felt, the whole length of that coast, from Taormina even to the Faro, considerable shocks; but near the village of Alli and Fiume de Nifi, which are situated about the middle of that line, shocks so violent were experienced, that they dreaded left the mouth of a volcano shou'd open. Each shock resembled the effort of a mine that had not strength to make an explosion. It appears, that then the volcano opened a free passage for the expansion of its vapours, and that they have since circulated without restraint; since in the year 1783 the earthquake was almost nothing upon that part of Sicily, at the time that Messina buried under its ruins the half of its inhabitants."

On this theory it is first to be observed, that there is a considerable disagreement in points of fact between M. Dolomieu and Sir William Hamilton. The former could find no account of any spark or other electrical phenomenon: the latter on the contrary, was affured that flames had often been seen to issue from the earth; and those he expressly attributes to a vapour charged with electrical fire. M. Dolomieu takes little notice of the rains that fell; while Sir William Hamilton attributes to them several of those disturbances of the earth, which, without them, would have seemed very extraordinary. The latter is only informed

N 2
us, that before a shock the clouds remained motionless; and that, after a heavy shower of rain, a smart shock followed. These were phenomena that showed some connection between what pulsed in the earth and in the atmosphere: but between these two there is no agent that we know of excepting electricity, at least there is no agent of sufficient strength to produce any violent effects by communication between the one and the other. The most enthusiastic imagination cannot suppose that huge cauldon of boiling water under Mount Ætna should make the clouds stand still over Calabria; and the quick succession of the shock to an heavy shower of rain that caused the whatever, it was, lay in the ground on which the rain fell, and that it could be put in action by what affected the surface of the ground. But the cause of earthquakes appears, from the facts related no. 25, to lie at a greater depth in the earth than 396 feet; but no shower of rain could affect the earth to this depth unless by making some alteration in its electricity. These phenomena, which M. Dolomieu has overlooked, evidently shew that electricity was concerned in this earthquake as well as others.

Another circumstance, which M. Dolomieu himself mentions, is a sufficient proof of electricity being concerned: and that is the presentiment which animals had of its approach. "The presentiment of animals (says he) at the approach of earthquakes, is a singular phenomenon, and which cannot fail to surprise us so much the more, as we know not by what organs it is communicated to them. Every species of animals experience it, especially dogs, geese, and poultry. The howlings of the dogs in the streets of Medina were so loud, that orders were issued to kill them." Now, we know that many animals have a presentiment of a change of weather; which may happen either from a change of the density of the atmosphere, or from some alteration in its electricity: but steam pent up in the bowels of the earth could affect no animal until it began to exert its effects. Sir William Hamilton likewise informs us, that geese seemed more affected by this caufe when in the water than out of it; which may easily be explained upon electrical principles, but not at all, at least not without the most extravagant suppositions, by steam pent up in caverns nobody knows where.

Again, it is evident that Mr Dolomieu's hypothesis is supported in the worst manner imaginable, viz. by arguing from things unknown to what we see; but the true method of argument always is from what we see to things unknown. By this unhappy error he has made choice of causes which cannot possibly answer the purpoze. Let any quantity of water we please be poured into the focus of mount Ætna; nay, let the sea itself break into it: the confequence could only have been what happened in 1755, viz. not an earthquake in Calabria, but a vast effusion of boiling water from the top of the mountain itself. Nature here made the experiment; and we have no reason to imagine that any other consequence would have followed, though it had been repeated ever so often. Our author seems also to have forgot, that aqueous steam is capable of condensation, and that when it is admitted into a cold place it instantly loses its expansive power. Let us suppose caverns upon caverns extended in any way he pleases: the greater their bulk, the more will he be embarrassed; for thus the steam would have room to circulate; and far from producing those dreadful convulsions, must have returned quietly into water, without being able to fill the earth in the leaf. It would appear indeed, that the power of aqueous steam is very much over-rated by M. Dolomieu and other writers. An anonymous author in the Journal de Physique for August 1783, has drawn a comparison between volcanoes and steam-engines; and expresses his surprise that nobody has taken notice of it sooner. "A steam-engine (says he), consists of a caldrup or boiler, covered with a lid, having an opening in the middle, to which is fitted an hollow cylinder, &c. The boiler is set over a fire and from the water in it rises a vapour, the expansive force of which raises the piston of the machine. The action of the vapour is afterwards instantaneously annihilated by a jet of cold water into the cylinder through a hole, when the weight of the atmosphere takes place, forces down the piston, and conformably raises the water in the pump. "It is known that vapour occupies a space of 15,000 or 16,000 times greater than the bulk of the water which produced it; hence it follows that the smaller the space is in which it is contained, the force of its expansion will be the greater. It has sometimes happened, that vapour, in a steam-engine, not having sufficient play, has burst the vessels in which it was contained, destroyed the building, and thrown the stones and boiling water to a great distance. It is now furnished with holes, by which the quantity of water can be ascertained, and with a valve which gives way when the vapour is supersaturated. When the vapour issues by this valve, it strikes the air with such force as to occasion a loud hissing noise. The force of vapour sufficient for raising a piston of a given diameter is equal to the weight of a column of water 22 feet in height, and of a base equal to the piston; so that, supposing a cubic foot of water to weigh 70 pounds, and the piston to be a foot square, the force of the vapour sufficient for raising it will be 1540 pounds: an agent so powerful, that hardly anything else in nature can be compared with it.

Now if we recollect the descriptions of volcanoes, their eruptions, the earthquakes and hissing noises which sometimes precede or accompany them; the stones of different sorts, boiling water, sulphur, tar, and all suppos'd binnins which they discharge; if we hear of rocks thrown to the distance of seven or eight miles from the mouth of the volcano; clouds of ashes, and torrents of lava, seas overflowing, rivers left dry, &c. &c. we will find all these the effects of great natural steam-engines: that is to say, they are produced by masses of combustible matter set on fire by fermentation, placed in the neighbourhood of caverns filled with the waters of the sea, of rivers or lakes. We cannot doubt that the interior parts of the earth are hollowed out into numberless caverns that extend in different directions, and to various depths; and that mountains and other inequalities, that the buildings raised by men, are merely the lid or covering, more or less raised of these caverns, which vary in shape, and in the materials of which they are composed. Places therefore covered with buildings and mountains, are more liable
ble to earthquakes, because they are less able to give way to the shock: and the farther places are distant from volcanoes, the less they have to fear from earthquakes; because the vapoour having room to expand itself by the ramifications of the subterraneous pailages, the shocks will be less violent and less frequent. It is this which, in all probability, has hitherto saved Naples.

"Now, let it not be said, that we have mistaken the cause of earthquakes: for if, on the one hand, we attentively consider the steam-engine and its effects, and on the other, observe volcanoes always in the neighbourhood of water, we will be convinced, that they differ in nothing from that machine, but because this is under the command and direction of art. The disapparance and formation of islands and mountains may be explained from the sinking in of caverns, or from their being lifted up by the force of vapour.—Lastly, those vapoours which, in the year 1783, covered the same time, and almost during four months, a part of Europe, Asia, and Africa, were probably vapour escaped from those great internal caverns, heated by a sufficient quantity of combustible matters, set on fire by fermentation in the great chemical laboratories in the bowels of the earth. In certain districts of Burgundy, those vapoours were found to be hot, for they dried up and destroyed the grapes."

Power of steam generally over-rated. 100

That the power of steam-engines is very great, there is no doubt; but all that we see them usually perform, is little more than merely overcoming the pressure of the atmosphere on the piston of the cylinder. Now this pressure is equally strong over the whole surface of the earth; so that before the ground could be shaken in the smallest degree, the whole pressure of the atmosphere would have to be overcome. But if we begin to make any calculations with regard even to this force, which must be removed as a preliminary, we shall find it to be inconceivably great. A square mile contains 27,878,400 square feet; and upon each of these the pressure is 2160 pounds. The atmospheric pressure on a square mile is the product of these two numbers, or 60,217,344,000 pounds; but the great earthquake of 1755 shook no less than 4,000,000 of square miles of the earth; and therefore must in the first place have overcome a pressure of more than 240,000 millions of millions of pounds: and after all this, it had still a much greater obstacle, viz. the immense weight and cohesion of the earth itself. Dr Stukeley* has calculated, that no conceivable quantity of gunpowder could have moved the earth shaken by the earthquake in Asia Minor, which affected a circle of 300 miles diameter: but the earthquake of 1755 must have required not only a much greater power to move the earth, affecting a surface much greater than that of a circle 300 miles in diameter, but also the atmospheric pressure abovementioned, which does not enter into the Doctor's calculation. There cannot therefore be any conceivable quantity of water, of fire, or of steam in the bowls of the earth, sufficient to produce such effects; nor is there any power in nature to which we can with the smallest probability attribute them, electricity alone excepted. Calculations have indeed been made, that the force of steam is 28 times greater than that of gunpowder; but this seems only to be in one particular case, viz. when water is thrown upon melted copper; which cannot possibly take place in the bowls of the earth. In other cases water explodes with much less violence; and, when thrown upon melted glass, does not explode at all. The very violent effects of water when thrown upon copper in fusion, therefore of water with copper most probably are to be attributed to a decomposition of the water, one part of it being united to the calx of the metal, and the other suddenly converted into an aerial vapour; the instantaneous production and rarefaction of which seems in most cases to be the cause of explosion*. The simple pressure of steam, and the bursting of a vessel by it when long continued, cannot on all be introduced as a parallel cafe, nor are the effects in any degree similar; because we cannot imagine solid metallic vessels in the bowls of the earth to confine the steam till it acquired such strength. At all events the steam must have penetrated the loose earth, which it could not fail to meet with in many places, loosened it, and condensed itself; and if any person will cover a steam engine with stones and rubbish instead of a close lid, he will certainly find this to be the case.

Explosion

The only power with which we are acquainted, and of the uses which is capable of producing earthquakes, then, being that of the electric fluid, it only remains to consider what uses they may be thought to answer in the system of nature. As they are the effects of the very highest natural power, it cannot be supposed that they are produced merely for the purposes of destruction; and, on the other hand, as they certainly do a great deal of mischief, it seems as difficult to assign any benevolent purpose they can answer. It is very generally supposed, indeed, that earthquakes are the means not to be by which Nature raises mountains and land from the bottom of the sea; but this can never be admitted. We have many instances of mountains being swallowed up and lost by earthquakes, but not a single well attested one of a mountain being raised by them; and even when volcanoes are taken into the account, by which some mountains and islands have certainly been raised, the balance appears against them, and more land seems to have been sunk by them than ever was raised*. It seems most probable therefore that earthquakes are accidental, and that the mischief they do is only to prevent a greater evil. This we see takes place throughout the whole system of nature. Thunder and lightning, violent rains, storms of wind, &c. are all productive of much damage on certain occasions; but we by no means suppose these phenomena to take place merely for destruction; and therefore we name such effects accidents. To the same account, though on a larger scale, must we place earthquakes; and it only now remains to consider what are the disasters still more terrible than earthquakes which we should have occasion to dread, did they not interpose to prevent them.

These evils are naturally to be dreaded from any general commotion of the electric fluid dispersed thro' the whole globe of earth. That it does preclude it to the centre, is what we can have no reason to doubt; but in the internal parts it seems to lie dormant, or to be employed in operations which never manifest themselves to us. Towards the surface it is manifestly set in motion by the light of the sun; which, as proved under the article Electricity, and in various other parts of this work, is the very same fluid. This produces

* See n°77.
A confant current of electric matter from the equator to the poles.

Dreadful confequences of an universal commotion in the electric fluid.

Why this can never take place.

Difpofes of the electric matter northward might be traced both thro' the bowels of the earth and through the atmosphere. The great shocks happened in the month of February, but continued more or less through the whole fummer.

Violent eruptions of fire in Greenland and Iceland.

Violent thunderstorms throughout all Europe.

Appears in the great meteor of 1783.

Was the very fame quantity of electric matter that had raised such horrid commotions in the earth and atmosphere, returning thro' the higher spaces to the fouth from whence it had originally proceeded.

Before we difmiss this article, it many still be neceffary to obviate an objection which may be raised from what is faid under the article Lighting. It is there fonned, that in the time of a thunderflorm, the parts of the earth which lie directly under the cloud are divided for some space downward into alternate zones poftively and negatively electrified; that the lightning from the cloud strikes not the uppermoft stratum directly, but only as it is impofible to avoid it, because it lies betwixt the cloud and the zone by which the electric matter is attracted. It may then be askep, Why an earthquake is not produced by the discharge of thefe two oppofite electricities into one another directly, without the production of any thunder? Here, however, we muft obferve, that the electricity is originally accumulated in the atmosphere, where the vapours serve as conductioners, and the surrounding air and upper surface of the earth being electrified the fame way, prevent the electric matter from ёlently diffening itself, by infulating the clouds in the fame manner that the conductor of a machine is infulated by the electric substance on which it stands. The flight of lightning muft therefore burft out from these conductioners in the very fame manner that a spark proceeds from the prime conductioner of an electrical machine, rather than from the globe or atmosphere next to it, though both of them are undoubtedly very highly electrified at the time the machine is in motion. At the fame time it muft be confidered, that this continual fashing of the atmospheral electricity towards the earth, prevents any very high degree of it from accumulating in either of the terrefrial zones already mentioned, fo as to produce any difcharge between them, which would indeed produce a flock of an earthquake.

From an unhappy accident which happened in 1785, Of electric matters discharging from the earth, in Calabria.

This was followed by the moft extraordinary effufion of lava recorded in his triey, which continued till the 12th of August. At this time there were violent and numerous thunder florms, firft in the fouther and then in the more northerly parts of Europe; the air was covered with a never ceasing haze, nor of a moft nature, as our author in the Journal de Physique tappoef, and which he abfurdly fays dried the grapes in Burgundy, but plainly of Some other kind, and which prevented the light of the sun from having its usual effect. Six days after the immense volcanic eruption in Iceland had ceafed, the great meteor made its appearance, which no doubt.
Earthquake.

115 Earthquakes cannot happen where there is a difference between the electricity of the atmosphere and that of the earth.

By these explosions, particularly the great one, the equilibrium of electricity in the atmosphere was instantly restored, and the clouds forthwith began to separate. The reason of this is explained under the article LIGHTNING, sec. vi. that just before an earthquake there is a perfect equilibrium between the electricity of the atmosphere and that of the surface of the earth. When this equilibrium is broken, the earth discharges its superfluous quantity either silently, by means of trees, grass, &c. or sometimes by explosions in different places; but as there is no general conductor, there cannot be any general discharge of the whole at once. The singular case of the great charge in 1783 may shew, only to the advantage of the presence of a good conductor, viz. the iron of the cart-wheels passing over the spot where the electric matter happened to be collected in great quantity. Had not this taken place, it is possible that a fire-ball might have risen from the earth; for the explosion produced effects extremely similar to those of the bursting of fire-balls*: but still this could have no effect in producing any shock of an earthquake; because the latter would have required a general discharge between two great infernal earths, where there cannot be any conductor to make partial ones.

In the time of earthquakes, however, there are undoubtedly many such electrical discharges from the earth as those just mentioned; and they are most probably the cause of those conical hollows observed by Sir William Hamilton. When water is abundant in any part of the earth, it serves as a conductor for some quantity of the electricity, and that fluid is violently thrown out into the air: but where there is a deficiency of water, the fire breaks forth in its proper form with loud explosions, as was observed; as well as the water spouts in Calabria in the year 1783. That year also the quantity of electric matter discharged by the earth into the air was manifest by the vast number of thunder storms which immediately followed them. No fire was observed at the time of the explosion which put an end to the thunder-storm above mentioned; but this must have arisen partly from its happening in the day-time, and partly from the electric matter having so many conductors to spend its force upon.

Having thus explained all the phenomena attending earthquakes, it remains only to show by what means the equilibrium of electricity can be broken in the bowels of the earth in such a manner as to produce these phenomena. The ultimate cause of this is mentioned under the article AURORA BOREALIS, n. 5. It is there shown, that the warmth of the sun must necessarily bring down to the earth much greater quantities of electric matter in the regions within the tropics than in the northern and southern climates. It is impossible, as is there also observed, that there can be a perpetual accumulation of electricity in one part of the earth, unless there is a passage for it into the atmosphere through some other. Hence, if the electric matter defends from the air into one place of the earth, it must necessarily ascend from the earth into the air in some other place. There must be therefore a continual current of electricity through the bowels of the earth, beginning at the equator, and extending northward and southward to both poles. While this current has a free passage from the earth in the northern and southern regions, every thing goes on quietly; and whatever storms may happen in the atmosphere, the solid earth cannot be affected. Innumerable circumstances, however, may tend to hinder this discharge, and consequently to accumulate the electric matter in particular places. One very obvious cause of this kind, is an excessive frost taking place in any part of the earth whence the electric matter was wont to be discharged. This renders the air itself so electric, that it cannot receive the fluid; at the same time that the water on the surface of the earth, being hard frozen, becomes electric also, and incapable of conducting. Very dry regions likewise contribute to produce the same effect; and thus the accumulation of electric matter in the warmer climates becomes prodigiously great. Hence perhaps we have some reason to conclude, that the excessive cold which prevailed over all Europe in 1782 was a principal cause of the earthquakes in 1783.

It must, however, be observed, that with regard to the operations of nature we cannot always reason analogically from our electric experiments. If a quantity of electricity is collected in any substance by artificial means, that quantity is taken off in a moment by the touch of any metallic substance or other good conductor. As the whole earth, therefore, is filled with a conducting substance, namely water, it may very naturally be asked, why does not the superfluous quantity of electric matter collected in one place, immediately diffuse itself through all other parts of the earth by means of the water with which it abounds?—To obviate this difficulty, however, it needs only be remembered, that as the earth is quite full of electric matter all round, no quantity can enter any particular part without being resisted by the rest which is diffused through the whole globe. This resistance will be proportioned to the facility with which it can escape at other places; and this it never can do, unless the earth is in a proper condition for emitting, and the atmosphere for receiving it. The pressure, therefore, upon the accumulated quantity of electric matter soon becomes exceedingly great, and its disposition to burst out with violence is every day increased. At last, as the fluid still continues to occasion the descent of more and more of the electric fluid, that particular part of the earth becomes fully charged. The consequence of this is, that the waters of fountains become foul; the electric matter being lodged in great quantity in the water, forces it into unusual agitations, by which the earth is mixed with it. The ocean, for the same reason, is raised in huge billows, &c.; and these appearances prognosticate the shock, in the same manner that flight flames from the knob of an electrified bottle prognosticate a discharge of all the electricity contained in it.

Before the earthquakes above described, of which the cause seems to depend entirely on a collection of electric matter in the bowels of the earth, there are others frequently felt in the neighbourhood of volcanoes, which:
which are plainly owing to the efforts of the burning matter to discharge itself. These, however, are but slight, and seldom extend to any considerable distance from the burning mountain. For a particular account of them, see the article VOLCANO.

EASEL PIECES, among painters, such smaller pieces, either portraits or landscapes, as are painted on the easel, i.e., the frame whereon the canvas is laid. They are thus called, to distinguish them from larger pictures drawn on walls, cienels, &c.

EASEMENT, in law, a privilege or convenience which one neighbour has of another, whether by charter or prescription, without profit: such are a way through his lands, a sink, or the like. These, in many cases, may be claimed.

EASING, in the sea-language, signifies the slackening a rope or the like. Thus, to ease the bow-line or sheet, is to let them go; to ease the helm, is to let the ship go more large, more before the wind, or more larboard.

EAST, one of the four cardinal points of the world; being that point of the horizon where the sun is seen to rise when in the equinoctial.

The word east is Saxon. In Italy, and throughout the Mediterranean, the east wind is called the levante; in Greek, ανατολά, and ανατολις, because it comes from the side of the sun, ανατολις; in Latin, orient.

EASTER, a festival of the Christian church, observed in memory of our Saviour's resurrection.

The Greeks call it Πάσχα, the Latins pascha, an Hebrew word signifying ραβάς, applied to the Jewish feast of the passover. It is called easter in English, from the goddes Eadre, worshipped by the Saxons with peculiar ceremonies in the month of April.

The Asiatic churches kept their easter upon the very same day that Jews observed their passover, and others on the first Sunday after the first full moon in the new year. This controversy was determined in the council of Nice; when it was ordained that easter should be kept on one and the same day, which should always be a Sunday, in all Christian churches in the world. For the method of finding easter by calculation, see CHRONOLOGY, No. 31.

Easter Island, an island in the South Sea, lying in N. Lat. 27° 27' Long. 109° 46'. It is thought to have been first discovered in 1686 by one Davis, an Englishman, who called it Davis's Land. It was next visited by Commodore Roggevein, a Dutchman, in 1722; who gave it the name of Easter Island, and published many fabulous accounts concerning the country and its inhabitants. It was also visited by a Spanish ship in 1727, the captain of which gave it the name of St. Carlos. The only authentic accounts of this island, however, which have yet appeared, are those published by Captain Cook and Mr. Forster, who visited it in the month of March 1774.—According to these accounts, the island is about 10 or 12 leagues in circumference, and of a triangular figure; its greatest length from north-west to south-east is about four leagues, and its greatest breadth two. The hills are so high, that they may be seen at the distance of 15 or 16 leagues. The north and east points of the island are of a considerable height; between them, on the south-east side, the shore forms an open bay, in which Captain Cook thinks the Dutch anchored in 1722. He himself anchored on the west side of the island, three miles northward from the south point. This, he says, is a good road with easterly winds; but a dangerous one when the wind blows from the contrary quarter, as the other on the south-east side meets with easterly winds; so that there is no good accommodation to be had for shipping round the whole island.

The island itself is extremely barren; and bears evident marks not only of a volcanic origin, but of having been not very long ago entirely ruined by an eruption. As they approached the south point, Mr. Forster informs us, that they observed the shore to rise perpendicular. It consisted of broken rocks, whose cavernous appearance, and black or ferruginous colour, seemed to indicate that they had been thrown up by subterraneous fire. Two detached rocks lie about a quarter of a mile off this point; one of them is singular on account of its shape, and represents a huge column or obelisk; and both these rocks were inhabited by multitudes of sea-fowls. On landing and walking into the country, they found the ground covered with rocks and stones of all sizes, which appeared to have been exposed to a great fire, where they seemed to have acquired a black colour and porous texture. Two or three shrivelled species of grasses grew among these stones, and in some measure softened the desolate appearance of the country. The farther they advanced, the more ruinous the face of the country seemed to be. The roads were intolerably rugged, and filled with heaps of volcanic stones, among which the Europeans could not make their way but with the greatest difficulty; but the natives leaped from one stone to another with surprising agility and ease. As they went northward along the island, they found the ground still of the same nature; till at last they met with a large rock of black melted lava, which seemed to contain some iron, and on which was neither soil nor grass, nor any mark of vegetation. Notwithstanding this general barrenness, however, there are several large tracts covered with cultivated soil, which produces potatoes of a gold yellow colour, as sweet as carrots, plantains, and sugar-canes. The soil is a dry hard clay; and the inhabitants use the grass which grows between the stones in other parts of the island as a manure, and for preserving their vegetables when young from the heat of the sun.

The most remarkable curiosity belonging to this island is a number of Colossal statues; of which, however, very few remain entire. These statues are placed only on the sea-coast. On the east side of the island were seen the ruins of three platforms of stone work, on each of which had stood four of these large statues; but they were all fallen down from two of them, and one from the third; they were broken or defaced by the fall. Mr. Wales measured one that had fallen, which was 15 feet in length, and six feet broad over the shoulders: each statue had on its head a large cylindrical stone of a red colour, wrought perfectly round. Others were found that measured near 27 feet, and upwards of eight feet over the shoulders; and a still larger one was seen standing, the height of which was insufficient to shelter all the party, consisting of near 30 persons, from the rays of the sun. The workmanship is rude, but not bad, nor are the features of the face ill formed; the ears are long, according to the distor...
tion practiced in the country, and the bodies have hardly anything of a human figure about them. How these islanders, wholly unacquainted with any mechanical power, could raise such stupendous figures, and afterwards place the large cylindric stones upon their heads, is truly wonderful! The most probable conjecture seems to be, that the stone is facitious; and that each figure was gradually erected, by forming a temporary platform round it, and raising it as the work advanced: but they are at any rate very strong proofs of the ingenuity and perseverance of the islanders in the age when they were built, as well as that the ancestors of the present race had been better days than their descendants enjoy. The water of this island is in general brackish, there being only one well that is perfectly fresh, which is at the east end of the island: and whenever the natives repair to it to flake their thirst, they wash themselves all over; and if there is a large company, the first leaps into the middle of the hole, drinks, and washes himself without ceremony; after which another takes his place, and so on in succession. This custom was much disrelished by their friends, who fed greatly in need of this valuable article, and did not wish to have it contaminated by such ablations.

The people are of a middle size. In general they are rather thin; go entirely naked; and have punctures on their bodies, a custom common to all the inhabitants of the South Sea islands. Their greatest singularity is the size of their ears, the lobe of which is stretched out so that it almost rests on their shoulder; and is pierced with a very large hole, capable of admitting four or five fingers with ease. The chief ornaments for their ears are the white down of feathers and rings which they wear in the inside of the hole, made of the leaf of the sugar-cane, which is very elastic, and for this purpose is rolled up like a watch-spring. Some were seen clothed in the same cloth used in the island of Otaheite, tinged of a bright orange-colour with turmeric; and these our voyagers supposed to be chiefs. Their colour is a chestnut-brown; their hair black, curling, and remarkably fine; and some of the fellows of which are all from the highest rank of the islanders. Their hair is about the third part as long as the face is cut short. The women are small, and slender-limbed: they have punctures on the face, resembling the patches sometimes used by European ladies; they paint their face all over with a reddish brown ruddle, and above this they lay a fine orange-colour extracted from turmeric-root; the whole is then variegated with flakes of white shell-lime. But the most surprizing circumstance of all with regard to these people, is the apparent fecrecy of women among them. The nicest calculation that could be made, never brought the number of inhabitants in this island to above 700, and of these the females bore no proportion in number to the males. Either they have but few females, or else their women were restrained from appearing during the day of the ship; notwithstanding, the men showed no signs of a jealous disposition, or the women any scruples of appearing in public: in fact, they seemed to be neither reserved nor chaste: and the large pointed cap which they wore gave them the appearance of professed wantons. But as all the women who were seen were liberal of their favours, it is more than probable that all the married and modest ones had concealed themselves from their impetuous visitants in some inaccessible parts of the island; and what further strengthens this supposition is, that heaps of stones were seen piled up into little hillocks, which had one steep perpendicular side, where a hole went under ground. The space within, says Mr Forster, could be but small; and yet it is probable that these cavities served, together with their miserable huts, to give shelter to the people at night; and they may communicate with natural caverns, which are very common in the lava curnens of volcanic countries. The few women that appeared were the most lascivious of their sex that perhaps have been ever noticed in any country, and liame seemed to be entirely unknown to them.

EATON, a town of Buckinghamshire, situated on the north side of the Thames, opposite to Windsor, and famous for its collegiate school, founded by King Henry VI. being a seminary for King's College, Cambridge, the fellows of which are all from this school.

EAU DE CARMES. See Pharmacy.

EAU de Luce. See Chemistry, n° 1037.

EACHES, in architecture, the margin or edge of the roof of a house; being the lowel tiles, slates, or the like, that hang over the walls, to throw off water at a distance from the wall.

EAVES-Droppers, are such persons as stand under the caves, or walls, and windows of a house, by night or day, to hearken after news, and carry it to others, and thereby cause strife and contention in the neighbourhood. They are called evil members of the commonwealth by the flat. i. c. 32. They may be punished either in the court-leet by way of presentment and fine, or in the quarter-sessions by indictment and binding to good behaviour.

EBRING of the Tides. See Tide.

EBDOMARIUS, in ecclesiastical writers, an officer formerly appointed weekly to superintend the performance of divine service in cathedrals, and prescribe the duties of each person attending in the choir, as to reading, singing, praying, &c. To this purpuse the ebdomyan, at the beginning of his year, drew up in form a bill or writing of the respective persons, and their several offices, the duties of which are, to have it published and the persons there named were styled intabulati.

EBDOMAN, in antiquity, a festival kept on the seventh of every lunar month, in honour of Apollo, to whom all seventh days were sacred, because one of them was his birth-day; whence it was sometimes called Ebdomagenes. For the ceremonies of this solemnity see Potter's Archael. Grac. lib. ii. cap. 20.

EBENUS, the Ebon Yree: A genus of the decandria order, belonging to the diadelphia clafs of plants: and in the natural method ranking under the 32d order, Papilionaceae. The segments of the calyx are the length of the corolla, and the latter has scarce any at all: there is one rough seed. There is but one species, the eretica, a native of the island of Crete, and some others in the Archipelago. It rife with a furlaby flalk three or four feet high, which puts out several side-branches garnished with hoary leaves at each joint, composed of five narrow spear-shaped lobes, which join at their roots to the footstalk, and spread out like the fingers of a hand. The branches are terminated by thick spikes of large purple flowers, which are of the butterfly or pea-bloom kind. The plants may be propagated from seeds sown in the autumn. In this coun-
EBION, the author of the history of the Ebionites, was a disciple of Cerinthus, and his successor. He improved upon the errors of his master, and added to them new opinions of his own. He began his preaching in Judea: he taught in Asia, and even at Rome. His tenets infected the Isle of Cyprus. St John opposed both Cerinthus and Ebion in Asia; and it is thought, that this apostle wrote his gospel, in the year 97, particularly against this heresy.

EBIONITES, ancient heretics, who rove in the church in the very first age thereof, and formed themselves into a sect in the second century, denying the divinity of Jesus Christ.

Origen takes them to have been so called from the Hebrew word ebion, which in that language signifies poor; because, says he, they were poor in feme, and wanted understanding. Eusebius, with a view to the same etymology, is of opinion they were thus called, as having poor thoughts of Jesus Christ, taking him for no more than a mere man.

It is more probable the Jews gave this appellation to the Christians in general out of contempt: because in the first times there were few but poor people that embraced the Christian religion. This opinion Origen himself seems to give into, in his book against Celcus, where he says, that they called Ebionites, such among the Jews as believed that Jesus was truly the expected Messiah.

It might even be urged, with some probability, that the primitive Christians assumed the name themselves, in conformity to their profession. It is certain, Epiphanius observes, they valued themselves on being poor, in imitation of the apostles. The same Epiphanius, however, is of opinion, that there had been a man of the name Ebion, the chief and founder of the sect of Ebionites, contemporary with the Nazarenes and Cerinthians. He gives a long and exact account of the origin of the Ebionites, making them to have risen after the destruction of Jerusalem, when the first Christians, called Nazarenes, went out of their cities.

The Ebionites are little else than a branch of Nazarenes: only that they altered and corrupted, in many things, the purity of the faith held among those first adherents to Christianity. For this reason, Origen distinguishes two kinds of Ebionites, in his answer to Celcus: the one believed that Jesus Christ was born of a virgin; and the other, that he was born after the manner of other men.

The first were orthodox in every thing, except that to the Christian doctrine they joined the ceremonies of the Jewish law, with the Jews, Samaritans, and Nazarenes; together with the traditions of the Pharisees. They differed from the Nazarenes, however, in several things, chiefly as to what regards the authority of the sacred writings; for the Nazarenes received all for scripture contained in the Jewish canon; whereas the Ebionites rejected all the prophets, and held the very names of David, Solomon, Isaiah, Jeremiah, and Ezekiel, in abhorrence. They also rejected all St. Paul's epistles whom they treated with the utmost disrespect.

They received nothing of the Old Testament but the Pentateuch; which should intimate them to have defended rather from the Samaritans than from the Jews. They agreed with the Nazarenes in using the Hebrew gospels of St. Matthew, otherwise called the Gospel of the Twelve Apostles: but they had corrupted their copy in abundance of places; and particularly, had left out the genealogy of our Saviour which was preserved entire in that of the Nazarenes, and even in those used by the Cerinthians.

Some, however, have made this gospel canonical, and of greater value than our present Greek gospel of St. Matthew: see Nazarenes. These, it is supposed, whole sentiments, as to the birth of our Saviour, were the same with those of the Ebionites, built their error on this very genealogy.

Beside the Hebrew gospel of St. Matthew, the Ebionites had adopted several other books, under the names of St. James, John, and the other apostles: they also made use of the Travels of St. Peter, which are supposed to have been written by St. Clement; but had altered them so, that there was scarce any thing of truth left in them. They even made that faint number of falsehoods, the better to authorise their own practices. See St. Epiphanius, who is very diffuse on the ancient heresy of the Ebionites, Her. 30. But his account defends little credit, as, by his own confession, he has confounded the other sects with the Ebionites, and has charged them with errors to which the first adherents of this sect were utter strangers.

EBONY or CURSE. See Ebony.

Ebony Wood is brought from the Indies, exceedingly hard and heavy, susceptible of a very fine polish, and on that account used in masonic and inlaid works, toys, &c. There are divers kinds of ebony: the most usual among us are black, red, and green, all of them the product of the island of Madagascar, where the natives call them indiscriminately hazon mainthi, q. d. black wood. The island of St. Maurice, belonging to the Dutch, like-wise furnishes part of the ebones used in Europe.

Authors and travellers give very different accounts of the tree that yields the black ebony. By some of their descriptions, it should be a sort of palm-tree; by others, a cytisus, &c. The most authentic of them is that of M. Flacourt, who resided many years in Madagascar as governor thereof; he assures us, that it grows very high and big, its bark being black, and its leaves resembling those of our myrtle, of a deep, dusky, green colour.

Tavernier assures us, that the islanders always take care to bury their trees, when cut down, to make them the blacker, and to prevent their splitting when wrought. F. Plumier mentions another black ebony-tree, discovered by him at St Domingo, which he calls Saputum portulake folius aculeatum ubeni materia. Candia also bears a little shrub, known to the botanists under the name of Eunus Creatas, above described.

Pliny and Dioscorides lay the best ebony comes from Madagascar as governor thereof; he assures us, that it grows very high and big, its bark being black, and its leaves resembling those of our myrtle, of a deep, dusky, green colour.

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Eboracum, and (in some copies) Ecatia.

Ecatia.

Eboracum, and Ecatia, are names of this city. It was first brought to Rome by Pompey, after he subdued the Britons. It is now much less used among us than anciently; since the discovery of so many ways of giving it another name, a modern name, the New called the Old.

As to the green ebony, besides Madagascar and St. Maurice, it likewise grows in the Antilles, and especially in the Isle of Tobago. The tree that yields it is very bulky; its leaves are smooth, and of a fine green colour. Beneath its bark is a white blea, about two inches thick; all beneath which, to the very heart, is a deep green, approaching towards a black, tho' sometimes streaked with yellow veins. Its use is not confined to moai work; it is likewise good in dyeing, as yielding a fine green tincture. As to red ebony, called algonadilla, we know little of it more than the name.

The cabinet-makers, inlayers, &c. make pear-tree and other woods pass for ebony, by giving them the black colour thereof. This done by a few washes of a hot decoction of galls; and when dry, adding writing ink therein, and polishing it with a stiff brush, and a little hot wax; and others heat or burn it. See Dyeing.

EBORACUM (anc. geog.), a famous city in the Brigantes in Britain, the residence of Septimius Severus and Constantius Chlorus, and where they both died; a Roman colony; and the station of the Legion Sexta Victrix. Now York. W. Long. 50. Lat. 54.

EBRO, an ancient town in Spain, which, taking its rise in Old Castile, runs through Biscay and Arragon, passes by Saragossa, and, continuing its course thro' Catalonia, discharges itself with great rapidity into the Mediterranean, about 20 miles below the city of Tortosa.

EBUDE or HEBudes (anc. geog.), islands on the west of Scotland. The ancients differ greatly as to their situation, number, and names; said in general to lie to the north of Ireland and west of Scotland. Now called the Western Isles, also Hebrides; this last a modern name, the reason of which does not appear, unless it be a corruption of Hebudes. By Beda called Mevanes, an appellation equally obscure.

EBULLITION, the name with boiling. The word is also used in a synonymous sense with Ecaulence.

EBUSUS (anc. geog.), the greatest of the two islands called Pyrene, in the Mediterranean, near the coast of Spain, to the south-west of Majorca. Famous for its pastures for cattle, and for its figs. Now Isicia, 100 miles in compass, without any noxious animals but rabbits, which often destroy the corn.

ECALESIA, Excalis, in antiquity, a festival kept in honour of Jupiter, named Hecales, or Hecades, from Hecate, one of the borough-towns in Attica.

ECASTOR, in antiquity, an oath wherein Castor was invoked. It was a custom for the men never to swear by Castor, nor by the women by Pollex.

ECAITEA, Excaisia, in antiquity, statues erected to the goddess Hecate, for whom the Athenians had a great veneration, believing that she was the overseer of light to their families, and that she protected their children.

ECASTIA, Excaris, in antiquity, an anniversary solemnity, observed by the Stratonicians, in honour of Hecate. The Athenians likewise had a public entertainment or supper every new moon, in honour of the same goddess. The supper was provided at the charge of the richer men; and was no sooner brought to the accustomed place but the poor people carried all off, giving out that Hecate had devoured it. For the rest of the ceremonies observed on this occasion, see Pott. Arch. Græc. lib. ii. cap. 20.

ECATOMBEON, Ecatombeon, in chronology, the first month of the Athenian year. It consisted of 30 days, and began on the first new moon after the former solstice, and consequently answered to the latter part of our June and beginning of July. The Boeotians called it Hippodromus, and the Macedonians Lon. See Month. The word is a derivative from the Greek ξεκατόμβος, a hecatomb, because of the great number of hecatombs sacrificed in it.

ECAVESSADE, in the manage, is used for a jerk of the cavelon.

ECBATANA (anc. geog.), the royal residence and the capital of Media, built by Darius king of the Medes, according to Herodotus: Pliny says, by Seleucus; but that could not be, because it is mentioned by Diodorus. It was situated on a gentle declivity, distant 12 stadia from Mount Orontes, and was in compass 150 stadia. Here stood the royal treasury and tombs. It was an open unvaulted town, but had a very strong citadel, encompassed with seven walls, one within and riting above another. The extent of the utmost was equal to the whole extent of Athens, according to Herodotus; the situation favouring this construction, as being a gentle ascent, and each wall was of a different colour. Another Ecbatana of Persia, a town of the Magi (Pliny).—A third of Syria.

ECCENTRICITY. See Eccentricity.

ECHELLENSIS (Abraham), a learned Moravite, whom the president 1st employed in the edition of his Polyglott Bible. Gabriel Sionita, his countryman, drew him to Paris, in order to make him his fellow-labourer in publishing that bible. They fell out. Gabriel complained to the parliament, and cruelly defamed his associate; their quarrel made a great noise. The congregation de propaganda fide associated him, 1536, with those whom they employed in making an Arabic translation of the scripture. They recalled him from Paris, and he laboured in that translation at Rome in the year 1672. While he was professor of the Oriental languages at Rome, he was pitched upon by the great duke Ferdinand II. to translate from the Arabic into Latin the 4th, 6th, and 7th books of Alphonso's Comics; in which he was assisted by John Alphonso Borelli, who added commentaries to them. He died at Rome in 1604.

ECCHYMOSIS, from ἐκχυμός to pour out, or from εξ out of, and χυμος juice. It is an effusion of humours from their respective vessels, under the integuments; or, as Paulus Epigenes says, "When the flesh is bruised by the violent collision of any object, and its small veins broken, the blood is gradually discharged from them." This blood, when collected under the skin, is called an ecchymosis, the skin in the mean time remaining entire; sometimes a tumor is formed by it, which is soft and livid, and generally without pain. If the quantity of blood is not considerable, it is usually reabsorbed; if much, it suppures; it rarely happens
that any further inconvenience follows; though, in
case of a very bad habit of body, a mortification may
be the result, and in such a case regard must be had
thereto.

ECCLAI'RCS EMENT. See ECSRl'AI-lCS
MENT.

ECCLESIASTES, a canonical book of the Old
Testament, the design of which is to show the vanity
of all flibinarly things.

It was composed by Solomon; who enumerates
the several objects on which men place their happiness,
and then shows the insufficiency of all worldly enjoy-
ments.

The Talmudists made king Hezekiah to be the
author of it; Grotius ascribes it to Zorobabel, and
others to Isaiah; but the general commentators
believe this book to be the produce of Solomon's re-
pentance, after having experienced all the follies and
errors, and the alderman, or in his absence the sheriff of
lay and civil courts, and commanded the suitors to appear
immediately in the pope,

ECCLESIASTICAL, an appellation given to
whatever belongs to the church: thus we say, ecclesi-
astical polity, jurisdiction, history, &c.

ECCLESIASTICAL COURTS. In the time of the Anglo-
Saxons there was no sort of distinction between the
lay and the ecclesiastical jurisdiction: the county-court
was as much a spiritual as a temporal tribunal: the
rights of the church were ascertained and assur-tered at the
same time, and by the same judges, as the rights
of the laity. For this purpose the bishop of the diocese,
and the alderman, or in his absence the sheriff of
the county, used to sit together in the county-court,
and had there the cognizance of all cases as well
ecclesiastical as civil: a superior deference being paid
to the bishop's opinion in spiritual matters, and to that
of the lay-judges in temporal. This union of power
was very advantageous to them both: the presence of the
bishop added weight and reverence to the sheriff's
proceedings: and the authority of the sheriff was equally
useful to the bishop, by enforcing obedience to his
decrees in such refractory offenders as would otherwise
have despised the thunder of mere世俗 court from the civil;
whether estab-
ished by principles of bigotry, or by those of a more re
nounced the laws of the church: whether Edward
abounding with the spirit of Saxon liberty, is not
altogether certain. But the latter, if not the cause,
was undoubtedly the consequence, of this separation:
for the Saxon laws were soon overborne by the Nor-
man juries, when the county-court fell into disre-
gard by the bishop's withdrawing his presence, in
obedience to the charter of the conqueror; which
prohibited any spiritual cause from being tried in the secu-
lar courts, and commanded the suitors to appear be-
fore the bishop only, whose decisions were directed to
conform to the canon law.

King Henry I. at his accession, among other re-
formations of the laws of king Edward the Confessor,
revived this union of the civil and ecclesiastical
courts. Which was, according to Sir Edward Coke,
after the great heat of the contest was past, only a
restitution of the ancient law of England. This how-
ever was still relished by the Popish clergy, who, under
the guidance of that arrogant prelate archbishop An-
felm, very early disapproved of a measure that put
them on a level with the profane laity, and subjected
spiritual men and causes to the jurisdiction of the secu-
lar magistrates; and therefore, in their synod at Wel-
minster, 3 Hen. I. they ordained, that no bishop should
attend the discussion of temporal causes; which soon
dissolved this newly effected union. And when, upon
the death of king Henry I. the usurper Stephen was
brought in and supported by the clergy, we find one
article of the oath which they imposed upon him was,
that ecclesiastical persons and ecclesiastical causes should
be subject only to the bishop's jurisdiction. And as it
was about that time that the contest and emulation be-
 gan between the laws of England and those of Rome,
the temporal courts adhered more and more to the
spiritual adopting the latter, as their rule of proce-
sing: this widened the breach between them, and
made a coalition afterwards impracticable; which prob-
bly would else have been effected at the general
reformation of the church.

Ecclesiastical Courts are various; as the ARCHDE-
AONE'S, the CONSISTORY, the Court of ARCHES, the
PECULIARS, the PARROCHIAL, and the great court
of appeal in all ecclesiastical causes, viz. the Court of
DELEGATES. See these articles.

As to the method of proceeding in the spiritual courts, it
must (in the first place) be acknowledged to their
honour, that though they continue to this day to de-
cide many questions which are properly of temporal
jurisdiction, yet justice is in general so ably and im-
partially administered in those tribunals (especially of the
superior kind), and the boundaries of their power
are now so well known and established, that no ma-
terial inconvenience at present arises from this jurisdic-
tion still continuing in the ancient channel. And,
should any alteration be attempted, great confusion
would probably arise, in overturning long established
forms.
forms, and new modelling a course of proceedings that has now prevailed for seven centuries.

The establishment of the civil-law process in all the ecclesiastical courts was indeed a master-piece of papal dexterity, as it made a coalition impracticable between them and the national tribunals, without manifest inconvenience and hazard. And this consideration had undoubtedly its weight in causing this measure to be adopted, though many other causes concurred. In particular, it may be here remarked, that the pseudo-creed, or collections of civil law, being written in the Latin tongue, and referring so much to the will of the prince and his delegated officers of justice, sufficiently recommended them to the court of Rome, exclusive of their intrinsic merit. To keep the laity in the darkest ignorance, and to monopolize the little science which then existed entirely among the monkish clergy, were deep-rooted principles of papal policy. And as the bishops of Rome affected in all points to mimic the imperial grandeur, as the spiritual prerogatives were moulded on the pattern of the temporal, so the canonical process was formed on the model of the civil law; the prelates embracing, with the utmost ardor, a method of judicial proceedings, which was carried on in a language unknown to the bulk of the people, which banished the intervention of a jury (that bulwark of Gothic liberty), and which placed an arbitrary power of decision in the breast of a single man.

The proceedings in the ecclesiastical courts are therefore regulated according to the practice of the civil and canon laws; or rather to a mixture of both, corrected and new-modelled by their own particular usages, and the interposition of the courts of common law. For, if the proceedings in the spiritual court be ever so regularly conformant to the rules of the Roman law, yet if they be manifestly repugnant to the fundamental maxims of the municipal laws, to which, upon principles of sound policy, the ecclesiastical process ought in every state to conform (as if they require two witnesses to prove a fact, where one will suffice at common law); in such cases a prohibition will be awarded against them. But, under these restrictions, their ordinary course of proceeding is, first, by citation, to call the party injuring before them. Then by libel (libelii, "a little book"), or by articles drawn out in a formal allegation, to set forth the complainant's ground of complaint. To this succeeds the defendant's answer upon oath; when if he denies or extenuates the charge, they proceed to proofs by witnesses examined, and their depositions taken down in writing by an officer of the court. If the defendant has any circumstances to offer in his defence, he must also propound them in what is called his defensive allegation, to which he is intimated in his turn to the plaintiff's answer upon oath, and may from thence proceed to proofs as well as his antagonist.

The canonical doctrine of purgation, whereby the parties were obliged to answer upon oath to any matter, however criminal, that might be objected against them (though long ago over-ruled in the court of chancery, the genius of the English law having broken through the bondage imposed on it by its clerical chancellors, and asserted the doctrines of civil as well as criminal), continued till the middle of the last century, to be upheld by the spiritual courts; when the legislature was obliged to interfere, to teach them a lesson of similar moderation. By the statute of Ecclesiastes, 13 Car. II. c. 12, it is enacted, that it shall not be lawful for any bishop, or ecclesiastical judge, to tender or administer to any person whatsoever, the oath usually called the oath ex officio, or any other oath whereby he may be compelled to confess, accuse, or judge himself of any criminal matter or thing, whereby he may be liable to any censure or punishment. When all the pleadings and proofs are concluded, they are referred to the consideration, not of a jury, but of a single judge; who takes information by hearing advocates on both sides, and thereupon forms his interlocutory decree, or definitive sentence, at his own discretion; from which there generally lies an appeal, in the several stages mentioned in the articles above referred to; though if the same be not appealed from him in 15 days, it is final, by the statute 25 Hen. VIII. c. 19.

But the point in which these jurisdictions are the most defective, is that of enforcing their sentences when pronounced; for which they have no other process but that of excommunication; which would be often defpised by obstinate or profane men, did not the civil law step in with its aid. See Excommunication.

Ecclesiastical Corporations, are where the members that compose them are spiritual persons. They were erected for the furtherance of religion and perpetuating the rights of the church. See Corporations.

Ecclesiastical State. See Clergy.

ECCLESIASTICUS, an apocryphal book, generally bound up with the scriptures, to called, from its being read in the church, ecclesia, as a book of piety and instruction, but not of infallible authority. The author of this book was a Jew, called Jesaias the son of Siraah. The Greeks call it the Wisdom of the son of Sirach.

Ecclesiastics, among the ancients, patrons of cities, who defended their rights, and took care of the public money. The office resembled that of the modern syndics.

Echape, in the manege, a horse begot between a stallion and a mare of different breeds and countries. Echaper, in the manege, a gallicism used in the academies implying to give a horse head, or to put on at full speed.

Echeneis, the remora, in ichthyology; a genus belonging to the order of thoracics. The head is fat, naked, depressed, and marked with a number of transverse ridges; it has ten rays in the branchiota membrane; and the body is naked. There are two species, viz. 1. The Remora, or sucking-fish, with a plate forked tail, and 18 spines on the head. It is found in the Indian ocean. 2. The neorhines, with an undivided tail, and 16 spines on the head. It is likewise native of the Indian ocean. These fishes are often found adhering to strongly to the sides of sharks and other great fishes, by means of the structure of its head, as to be got off with difficulty. This fish was believed, by all the ancients to have most wonderful powers, and to be able, by adhering to the bottom, to arrest the
Echium, in architecture, a member or ornament near the bottom of the Ionic, Corinthian, and Composite capitals.

Echites, in botany: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 41st order, Asperifoliae. The corolla is irregular, with the throat naked. There are seven species, three of which are natives of Britain. None of them have any remarkable property, except that the flowers of one species (the vulgare) are very grateful to bees. It is a native of many parts of Britain. The stem is rough with hairs and tubercles. The leaves are spear-shaped, and rough with hair. The flowers come out in lateral spikes. They are first red, afterwards blue, sometimes purple or white.—Cows and sheep are not fond of the plant; horsetails and goats refuse it.

Echo, or Echo, a sound reflected or reverberated from a solid, concave, body, and so repeated to the ear. The word is formed from the Greek ἕχος, found, which comes from the verb ἔχω, to hold. The ancients being wholly unacquainted with the true cause of the echo, ascribed it to several causes sufficiently whimsical. The poets, who were not the worst of their philosophers, imagined it to be a person of that name metamorphosed, and that she affected to take up her abode in particular places; for they found by experience, that she was not to be met with in all. (See below, Echo in fabulous history.) But the moderns who knew found to confit in a certain tremor or vibration in the resonant body communicated to the contiguous air, and by that means to the ear, give a more consonant account of echo. For a tremulous body, striking on another solid body, it is evident, may be repeated without destroying or diminishing its tremor; and consequently a sound may be redoubled by the reflection of the tremulous body, or air.

But a simple reflection of the resonant air, is not enough to solve the echo: for then every plain surface of a solid hard body, as being fit to reflect a voice or sound, would redouble it; which we find does not hold.

To produce an echo, therefore, it should seem that a kind of conformation or vaulting were necessary, in order to collect, and by collecting to heighten and increase, and afterwards reflect, the sound; as we find is the case in reflecting the rays of light, where a concave mirror is required.

In effect, as often as a sound strikes perpendicularly on a wall, behind which is any thing of a vault or arch, or even another parallel wall; so often will it be reverberated in the same line, or other adjacent ones.

For an echo to be heard, therefore, it is necessary the ear be in the line of reflection; for the person who made the sound to hear its echo, it is necessary he be per-
perpendicular to the place which reflects it: and for a manifold or tautological echo, it is necessary there be a number of walls, and vaults or cavities, either placed behind or fronting each other.

A single arch or concavity, &c. can scarce ever stop and reflect all the sound; but if there be a convenient disposition behind it, part of the sound propagated thither, being collected and reflected as before, will present another echo; or, if there be another concavity, opposed at a due distance to the former, the sound reflected from the one upon the other will be told back again by this latter, &c.

Many of the phenomena of echoes are well considered by the bishop of Leighs, &c. who remarks, that any sound, falling either directly or obliquely on any dense body of a smooth, whether plain or arched superficies, is reflected, or echoes, more or less. The surface, says he, must be smooth; otherwise the air, by reverberation, will be put out of its regular motion, and the found thereby broken and extinguished. He adds, that it echoes more or less, according to how much of all things are as before described, there is still an echoing, tho' it be not always heard: either because the direct found is too weak to beat quite back again to him that made it; or that it does return to him, but so weak, that it cannot be discerned; or that he to receive the sound, either from his head, under his feet, or on one side of him; and which therefore may be heard by a man standing in the place where the reflected sound does come, provided no interposed body intercepts it, but not by him that first made it.

Echoes may be produced with different circumstances. For, 1. A plane obstacle reflects the sound back in its due tone and loudness; allowance being made for the proportionable decrease of the sound, according to its distance.

2. A convex obstacle reflects the sound somewhat smaller and somewhat quicker, though weaker, than otherwise it would be.

3. A concave obstacle echoes back the sound, bigger, flower, and also inverted; but never according to the order of words.

Nor does it seem possible to contrive any single echo, that shall invert the found, and repeat backwards; because, in such case, the word lost spoken, that is, which last occurs to the obstacle, must be repelled first; which cannot be.

For where in the mean time should the first words hang and be concealed; or how, after such a pause, be revived, and animated again into motion?

From the determinate concavity or arches of the reflecting bodies, it may happen that some of them shall only echo back one determinate note, and only from one place.

4. The echoing body being removed farther off, it reflects more of the found than when nearer; which is the reason why some echoes repeat but one syllable, some one word, and some many.

5. Echoing bodies may be so contrived and placed, as that reflecting the found from one to the other, either directly and mutually, or obliquely and by succession, out of one found, a multiple echo or many echoes shall arise.

Add, that a multiple echo may be made, by so placing the echoing bodies at unequal distances, that they may reflect all one way, and not one on the other; by which means, a manifold successive found will be heard; one clap of the hands, like many; one ha, like a laughter; one single word, like many of the same tone and accent; and so one viol, like many of the same kind, imitating each other.

Lastly, echoing bodies may be ordered, that from any one sound given, they shall produce many echoes different both as to tone and intention. By which means a musical room may be so contrived, that not only one instrument playing therein shall seem many of the same fort and size, but even a concert of different ones, only by placing certain echoing bodies, so that any note played shall be returned by them in 3ds, 5ths, and 8ths.

Echo, is also used for the place where the repetition of the found is produced or heard.

Echoes are distinguished into divers kinds, viz. 1. Single, which return the voice but once. Whereof some are tautological, which only return a voice when modulated into some particular musical tone; Others, polysyllabical, which return many syllables, words, and sentences. Of this last kind is that fine echo in Woodstock-park, which Dr. Plot affures us, in the daytime, will return very distinctively seventeen syllables, and in the night twenty.

2. Multiple, or tautological; which return syllables and words the same oftentimes repeated.

In echoes, the place where the speaker stands is called the centrum phonicum; and the object or place that returns the voice, the centrum phonocapticum.

At the sepulchre of Metella, wife of Cæstius, was an echo, which repeated what a man said five times. Authors mention a tower at Cyzicus, where the echo, redoubles founds, &c. whore remarks, that any note played shall only echo back the found, big repetitions. And whereas, in this, the echoes thall arise. ECHO occurs 725. And hence.

For in the mean time should the words hang and be concealed; or how, after such a pause, be revived, and animated again into motion?

From the determinate concavity or archedness of the reflecting bodies, it may happen that some of them shall only echo back one determinate note, and only from one place.

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E C T  [ 296 ]   E C T

Ecliptics were also a certain set of physicians among the ancients, of whom Archigenes, under Trajan, was the chief, who selected from the opinions of all the other sects, that which appeared to them best and most rational; hence they were called eclectics, and their pretensions medicina eclectica.

ECLIPSE, in astronomy, the deprivation of the light of the sun, or of some heavenly body, by the interposition of another heavenly body between our sight and it. See Astronomy-Index.

ECLIPTIKA, in botany, a genus of the polygama superflua-order, belonging to the syngentia class of plants. The receptacle is chaffy; there is no pappus, and the corollule of the disk quadrifid.

ECLIPTIC, in astronomy, a great circle of the sphere, supposed to be drawn through the middle of the zodiac, making an angle with the equinocial of about 23° 27', which is the sun's greatest declination; or, more strictly speaking, it is that path or way among the fixed stars, that the earth appears to describe to an eye placed in the sun. See Astronomy-Index.

Some call it via Solis, "the way of the sun," because the sun in his apparent annual motions never deviates from it, as all the other planets do more or less.

ECLIPSE, in geography, a great circle on the terrestrial globe, not only answering to, but falling within, the plane of the celestial ecliptic. See Geography.

ECLOGUE, in poetry, a kind of pastoral composition, wherein shepherds are introduced conversing together. The word is formed from the Greek ἔκλογας, "the shepheard's choice; so that, according to the etymology, eclogue should be no more than a shepheard's choice piece; but custom has determined it to a farther signification, viz. a little elegant composition in a simple natural style and manner.

Idyllion and eclogue, in their primary intention, are the same thing; thus, the idyllia, ιδυλλία, of Theocritus, are pieces wrote perfectly in the same vein with the eclogue of Virgil. But custom has made a difference between them, and appropriated the name eclogue to pieces wherein shepherds are introduced speaking; idyllion, to those wrote like the eclogue, in a simple natural style, but without any shepherds in them.

ECLUSE, a small but strong town of the Dutch Low Countries, in the county of Flanders, with a good harbour and sluices. The English besieged it in vain in 1405, and the people of Bruges in 1436. But the Dutch, commanded by Count Maurice of Nassau, took it in 1644. It is defended by several forts, and stands near the sea. E. Long, 3. 10. N. lat. 50. 25.

ECPHRACTICS, in medicine, remedies which at­

Towards the close of the second century a sect arose in the Christian church under the denomination of Eclectics, or modern Platonists. They professed to make truth the only object of their enquiry, and to be ready to adopt from all the different systems and sects, such tenets as they thought agreeable to it. However, they preferred Plato to the other philosophers, and looked upon his opinions concerning God, the human soul, and things invisible, as conformable to the spirit and genius of the Christian doctrine. One of the principal patrons of this system was Ammonius Saccas, who at this time laid the foundation of that sect, afterwards distinguished by the name of the new Platonists, in the Alexandrian school. See Am­

On
on being informed that pope Severinus had condemned it, as favouring the Monothelitians; declaring at the same time, that Sergius, patriarch of Constantinople, was the author of it.

ECTHILIPSIS, among Latin grammarians, a figure of prodigy whereby the  and at the end of a word, when the following word begins with a vowel, is elided, or cut off, together with the vowel preceding it, for the sake of the measure of the verse: thus they read utile, or malum utile.

ECTROPIUM, in surgery, is when the eye-lids are inverted, or retraced, so that they show their internal or red surface, and cannot sufficiently cover the eye.

ECTYLOTICS, in pharmacy, remedies proper for concluding calliologies.

ECU, or Escu, a French crown; for the value of which, see Money.

EDDA, in antiquities, is a system of the ancient Icelandic or Runic mythology, containing curious particulars of the theology, philosophy, and manners, of the northern nations of Europe; or of the Scandinavians, who had migrated from Asia, and from whom our Saxon ancestors were descended. Mr Mallet apprehends that it was originally compiled, soon after the Pagan religion was abolished, as a course of poetical lectures, for the use of such young Icelanders as devoted themselves to the profession of a seafal or poet. It consists of two principal parts; the first containing a brief system of mythology, properly called the Edda; and the second being a kind of art of poetry, and called skald or poets. The most ancient Edda was compiled by Sæmund Sigfusson, furnished the Learned, who was born in Iceland about the year 1057. This was abridged, and rendered more easy and intelligible about 1200 years afterwards, by Snorro Scurlfend, who was supreme judge of Iceland in the years 1215 and 1220; and it was published in the form of a dialogue. He added also the second part in the form of a dialogue, being a detail of different customs transferred among the divinities. The only three pieces that are known to remain of the more ancient Edda of Sæmund, are the Völuspá, the Havamæl, and the Runic chapter. The Völuspá, or prophesy of Vola or Fola, appears to be the text, on which the Edda is the comment. It contains in two or three hundred lines the whole system of mythology, discolored in the Edda, and may be compared to the Sibylline verses, on account of its lacinious bold style, and its imagery and obscurity. It is professedly a revelation of the decrees of the Father of nature, and the actions and operations of the gods. It describes the chaos, the formation of the world, with its various inhabitants, the function of the gods, their mutual advantages, their quarrels with Loki their great adversary, and the vengeance that ensued; and concludes with a long description of the final state of the universe, its dissolution and confagation, the battle of the inferior deities, and the evil beings, the renovation of the world, the happy lot of the good, and the punishment of the wicked. The Havamæl, or Sublime Discourse, is attributed to the god Odin, who is supposed to have given these precepts of wisdom to mankind; it is comprised in about 1200 stanzas, and resembles the book of Proverbs. Mr Mallet has given several extracts of this treatise on the Scandinavian ethics. The Runic chapter contains a short system of ancient magic, and especially of the enchantments wrought by the operation of Runic characters, of which Mr Mallet has also given a specimen. A manuscript copy of the Edda of Snorro is preserved in the library of the university of Upsal; the first part of which has been published with a Swedish and Latin version by M. Goranof. The Latin version is printed as a supplement to M. Mallet's Northern Antiquities. The first edition of the Edda was published by Refettius, professor at Copenhagen, in a large quarto volume, in the year 1665; containing the text of the Edda, a Latin translation by an Icelandic priest, a Danish version, and various readings from different MSS. M. Mallet, has also given an English translation of the first part, accompanied with remarks; from which we learn, that the Edda teaches the doctrine of the Supreme, called the Universal Father, and Odin, who lives for ever, governs all his kingdom, and directs the great things as well as the small; who formed the heaven, earth, and air; made man, and gave him a spirit or soul, which shall live, after the body shall have moulder away; and then all the dust shall dwell with him in a place Gimle or Vingolf, the palace of friendship; but wicked men shall go to Hela, or death, and from thence to Nifheim, or the abode of the wicked, which is below in the ninth world. It inculcates also the belief of several inferior gods and goddesses, the chief of whom is Frigg or Frea, i. e. lady, meaning hereby the earth, who was the spouse of Odin or the Supreme God; whence we may infer that, according to the opinion of these ancient philosophers, this Odin was the active principle or soul in the world, which uniting itself with matter, had thereby put it into a condition to produce the intelligences or inferior gods, and men and all other creatures. The Edda likewise teaches the existence of an evil being called Lokr, the calumniator of the gods, the author of fraud, who deludes all other beings in cunning and peradventure. It teaches the creation of all things out of an abyss or chaos; the final destruction of the world by fire; the absorption of the inferior divinities, both good and bad, into the bosom of the grand divinity, from whom all things proceeded, as emanations of his essence, and who will survive all things; and the renovation of the earth in an improved state.

EDDIsh, or Edish, the latter pasture or grafs that comes after mowing or reaping; otherwise called eagrafs or earfs and etch.

EDDOES or EDDERS, in botany; the American name of the Aoum efculentum.

EDDY (Saxon), or edy, "backward," and as "water," among seamen, is where the water runs back contrary to the tide; or that which hinders the free passage of the stream, and so caues it to return again. That eddy water which falls back, as it were, on the rudder of a ship under sail, the seamen call the dead-water.

EDDY-Wind is that which returns or is beat back from a sail, mountain, or any thing that may hinder its passage.

EDLINCK (Gerard), a famous engraver, born at Antwerp, where he was instructed in drawing and engraving.
Edelinck, engraving. He settled at Paris, in the reign of Louis XIV. who made him his engraver in ordinary.

Edelinck was also councilor in the Royal Academy of Painting. His works are particularly esteemed for the neatness of the engraving, their brilliant effect, and the prodigious ease apparent in the execution; and to this facility is owing the great number of plates we have of his; among which are excellent portraits of a great number of illustrious men of his time. Among the most admired of his prints, the following may be specified as holding the chief place.

1. A Battle between four Horsemen, with three figures lying slain upon the ground, from Leonardo da Vinci.
2. A Holy Family, with Elizabeth, St John, and two Angels, from the famous picture of Raphael in the king of France's collection.

Among the figures first added at the bottom of the plate; the second are with the arms; and in the third they are taken out, but the place where they had been inferred is very perceptible.

3. Mary Magdalene bewailing her sins, and trampling upon the riches of the world, from Le Brun. The first impressions are without the narrow border which surrounds the print. 4. Alexander entering into the Tent of Darius, a large print on two plates, from Le Brun. This engraving belongs to the three battles, and triumphal entry of Alexander into Babylon, by Girard Audran, and completes the set. The first impressions have the name of Guyton the printer at the bottom.
5. Alexander entering into the Tent of Darius (finished by P. Drevet), from Peter Mignard. Edelinck died in 1707, in an advanced age, at the Hotel Royal at the Gobelins, where he had an apartment. He had a brother named Jobu, who was a skilful engraver, but died young.

EDEN (Moses), the name of a country, with a garden, in which the progenitors of mankind were settled by God himself: The term denotes pleasure or delight. It would be endless to recount the several opinions concerning its situation, some of them very wild and extravagant. Moses says, that "a river went out of Eden to water the garden, and from thence it was parted and became into four heads." This river is supposed to be the common channel of the Euphrates and Tigris, after their confluence; which parted again, below the garden, into two different channels: so that the two channels before, and the other two after their confluence, constitute the heads mentioned by Moses. Which will determine the situation of the garden to have been in the south of Mesopotamia, or in Babylonia. The garden was also called Paradise; a term of Peric original, denoting a garden. See Paradise.

EDGINGS, in gardening, the series of small but durable plants, set round the edges or borders of flower-beds, &c. The best and most durable of all plants for this use, is box; which, if well planted, and rightly managed, will continue in strength and beauty for many years. The feasons for planting this, are the autumn, and very early in the spring; and the best species for this purpose is the dwarf Dutch box.

Formerly, it was also a very common practice to plant borders, or edgings, of aromatic herbs; as thyme, savory, hyssop, lavender, and the like: but these Edhilingus are all apt to grow woody, and to be in part, or wholly, destroyed in hard winters. Dailies, thrift, or sea-jolly-flower, and camomile, are also used by some for this purpose: but they require yearly transplanting, and a great deal of trouble, else they grow out of form; and they are also subject to perils in very hard feasons.

EDHILINGUS, or Edhilingi, an ancient appellation of the nobility among the Anglo-Saxons.

The Saxon nation, says Richard (Hist. lib. iv.) is divided into three orders or classes of people; the edhilingi, the frilingi, and the laaxi; which signify the nobility, the freemen, and the vaflals or slaves. Instead of edhilingi, we sometimes meet with atheling, or atheling; which appellation was likewise given to the king's son, and the preeminent heir of the crown. See Atheling.

EDICT, in matters of polity, an order or instrument, signed and sealed by a prince, to serve as a law to his subjects. We find frequent mention of the edicts of the prætor, the ordinances of that officer in the Roman law. In the French law, the edicts are of several kinds: some importing a new law or regulation; others, the creation of new offices; establishments of duties, rents, &c.; and sometimes articles of pacification.

In France, edicts are much the same as a proclamation is with us: but with this difference, that the former have the authority of a law in themselves, from the power which lieth them forth, whereas the latter are only declarations of a law, to which they refer, and have no power in themselves.

EDILE, or ÆDILE. See ÆDILE.

EDINBURGH, a city of Mid-Lothian in Scotland, situated in W. Long. 3°, and N. Lat. 56°, near the southern bank of the river Forth. — The origin of the name, like that of most other cities, is very uncertain. Some imagine it to be derived from Eth, a suffixed name to the people of that country, others from Edwin, a Saxon prince of Northumberland, who over-ran the whole or greatest part of the territories of the Picts about the year 617; while others choose to derive it from two Gaelic words Dun Edin, signifying the face of a hill. The name Edinburgh itself, however, seems to have been unknown in the time of the Romans. The most ancient title by which we find this city distinguished is that of Castell Mynyd Agned; which, in the British language, signifies the fortresses of the hill of St Agnes.

Afterwards it was named Caflrum Puellarem, because the Pictish princes were educated in the castle (a necessary protection in those barbarous ages) till they were married. — The ages in which these names were time of given cannot indeed now be exactly ascertained; but its foundation is uncertain, and the town certainly cannot boast of very great antiquity.

The Romans, during the time they held the dominion of part of this island, divided their possessions into six provinces. The most northerly of these was called V伦cia, which comprehended all the space between the walls of Adrian and Severus. Thus, Edinburgh, lying on the very out-flanks of that province which was most exposed to the ravages of the barbarians, became per-
In 1174, the castle is very ancient. It continued in the hands of the Saxons or English from the invasion of Ócda and Eufa in the year 452 till the defeat of Egfrid king of Northumberland in 685 by the Picts, who then repossessed themselves of it. The Saxons kings of Northumberland reconquered it in the ninth century; and it was retained by their successors till the year 956, when it was given up to Indulphus king of Scotland. In 1093; it was unsuccessfully besieged by the usurper Donald Bane. Whether the city was at that time founded or not is uncertain. Most probably it was: for as protection from violence was necessary in those barbarous ages, the castle of Edinburgh could not fail of being an inducement to many people to settle in its neighbourhood; and thus the city would gradually be founded and increase.—In 1128, King David I. founded the Abbey of Holyroodhouse, for certain canons regular; and granted to the person in whom he had vested the town Burgamae de Edimburg, "my borough of Edinburgh," by the same charter he granted these canons 40 shillings yearly out of the town revenues; and likewise 48 shillings more, from the same, in case of the failure of certain duties payable from the king's revenue; and likewise one half of the tallow, lard, and hides, of all the beasts killed in Edinburgh.

In 1174, the castle of Edinburgh was surrendered to Henry II. of England, in order to purchase the liberty of King William I. who had been defeated and taken prisoner by the English. But when William recovered his liberty, he entered into an alliance with Henry, and married his cousin Ermengarde; upon which the castle was restored as part of the queen's dowry.

In 1215, this city was first distinguished by having a parliament and provincial synod held in it.—In 1296, the castle was besieged and taken by Edward I. of England; but was recovered in 1313 by Randolph Earl of Moray, who was afterwards regent of Scotland during the minority of King David II. At last King Robert destroyed this fortress, as well as all others in Scotland, lest they should afford shelter to the English in any of their after incursions into Scotland. —It lay in ruins for a considerable number of years; but was afterwards rebuilt by Edward III. of England, who placed a strong garrison in it. In 1341 it was reduced by the following stratagem. A man, pretending to be an English merchant, came to the governor, and told him that he had on board his ship in the Firth some wine, beer, biscuits, &c. which he would sell him on very reasonable terms. A bargain being made, he promised to deliver the goods next morning at a very reasonable rate: but at the time appointed, twelve men, disguised in the habit of sailors, entered the castle with the goods and supposéd merchant; and having instantly killed the porter and centinels, Sir William Douglas, on a preconcerted signal, rushed in with a band of armed men, and quickly made himself master of the place, after having cut moli of the garrison in pieces.

The year 1437 is remarkable for the execution of the Earl of Athol and his accomplices, who had a concern in the murder of James I. The crime, it must be owned, was execrable; but the punishment was at Edinburgh, together shocking to humanity. For three days successively the traitors were tortured by putting on their heads iron crowns heated red hot, dislocating their joints, pinching their flesh with red hot pincers, and carrying them in that dreadful situation through the streets upon hurdles. At last an end was put to their sufferings, by cutting them up alive, and feeding the parts of their mangled bodies to the principal towns of the kingdom.

About the end of the 14th century it was customary to consider Edinburgh as the capital of the kingdom. The town of Leith, with its harbour and mills, had been bequeathed upon it by Robert I. in 1320; and his grandson John Earl of Carrick, who afterwards acceded the throne by the name of Robert III. conferred upon all the burgesses the singular privilege of building houses in the castle, upon the sole condition that they should be persons of good fame; which we must undoubtedly consider as a proof that the number of those burgesses was at that time very small. In the 15th century a very considerable privilege was conferred on the city by Henry VI. of England when in a state of exile; viz. that its inhabitants should have liberty to trade to all the English ports on the same terms with the city of London. This extraordinary privilege was bestowed in consequence of the kindness with which that king was treated in a visit to the Scottish monarch at Edinburgh; but as Henry was never restored, his gratitude was not attended with any benefit to this city. From this time, however, its privileges continued to be increased from various causes. In 1482 the citizens had an opportunity of liberating King James from the oppression of his nobles, by whom he had been imprisoned in the castle. On this account the provost was by that monarch made hereditary high sheriff within the city, an office which he continues still to enjoy. The council at the same time were invested with the power of making laws and statutes for the government of the city; and the trades, as a testimony of the royal gratitude for their loyalty, received the banner known by the name of the Blue Blanket; an ensign formerly capable of producing great commotions, but which has not now been displayed for many years past. However, it still exists; and the convener of the trades has the charge of keeping it.

It was not long after the discovery of America that Venereal the venereal disease, imported from that country, made its way to Edinburgh. As early as 1497, only five persons perished; 10 years after the voyage of Columbus, we find it looked upon as a most dreadful plague; and the unhappy persons affected with it were separated as effectually as possible from society. The place of their exile was Inchkeith, a small island near the middle of the Firth; which, small as it is, has a spring of fresh water, and now affords pasture to tame sheep.

By the overthrow of James IV. at the battle of Flodden, the city of Edinburgh was overwhelmed with grief and confusion, that monarch having been guard. attended in his unfortunate expedition by the Earl of Angus, then provost with the rest of the magistrates, and a number of the principal inhabitants of whom perished in the battle. After this disaster, the inhabitants being alarmed for the safety of their city,
Edinburgh, it was enacted that every fourth man should keep watch at night; the fortifications of the town were renewed, the wall being also extended in such a manner as to enclose the Graffmarket, and the field on which Heriot's Hospital, the Grey Friars Church, and Charity Workhouse, stood. On the east side it was made to enclose the College, Infirmary, and High School; after which, turning to the north, it met the old wall at the Netherbow-port. After this alarm was over, the inhabitants were gradually relieved from the trouble of watching at night, and a certain number of militia appointed to prevent disturbances; who continue to this day, and are known by the name of the Town Guard. Before these new enclosures, most of the principal people lived in the Cowgate without the wall; and the burying place was situated where the Parliament Close now is. In these days of peace, when no alarm of an enemy is at all probable, great part of the walls, with all the gates, have been taken down, and the city laid quite open, in order to afford more ready passage to the great concourse of people with whom the street is daily filled. But at the period we speak of, not only were the inhabitants much less numerous by reason of the small extent of the city, but it was depopulated by a dreadful plague; so that to stop if possible the progress of the infection, all houses and shops were shut up for 14 days, and some where infected persons had died were pulled down altogether.

In 1504, the tract of ground called the Burgh Mair was totally overgrown with wood, though now it affords not the smallest vestige of having been in such a state. So great was the quantity at that time, that it was encased by the town-council, that whoever inclined to purchase as much wood as was sufficient to make a new front for their house, might extend it seven feet into the street. Thus the city was in a short time filled with houses of wood instead of stone; by which, besides the inconvenience of having the street narrowed 14 feet, and the beauty of the whole entirely marred, it became much more liable to accidents by fire: but almost all these are now pulled down; and in doing this a singular taste in the masonry which supported them is said to have been discovered. 1542, a war with England having commenced through the treachery of Cardinal Beaton, an English fleet of 200 sail entered the Forth; and having landed their forces, quickly made themselves masters of the towns of Leith and Edinburgh. They next attacked the castle, but were repulsed from it with loss; and by this they were so enraged, that they not only destroyed the towns of Edinburgh and Leith, but laid waste the country for a great way round. These towns, however, speedily recovered from their ruinous state; and, in 1547, Leith was again burned by the English after the battle of Pinkie, but Edinburgh was spared.

Several disturbances happened in this capital at the time of the Reformation, of which an account is given under the article Scotland; but none of these greatly affected the city till the year 1570, at which time there was a civil war on account of Q. Mary's forced resignation. The regent, who was one of the contending parties, bought the cattle from the perpicious governor (Balfour) for 5000l. and the priory of Pittenweem. He did not, however, long enjoy the fruits of this infamous bargain. Sir William Kirkaldy, the new governor, a man of great integrity and bravery, declared for the Queen. The city in the mean time was sometimes in the hands of one party and sometimes of another; during which contentions, the inhabitants, as may easily be imagined, suffered extremely. In the year 1570 aforesaid, Queen Elizabeth sent a force of Sir William Drury, to assist the king's party. The castle was surrendered; and several skirmishes happened during the space of two years, in which a kind of predatory war was carried on. At last a truce was agreed on till the month of January 1573; and this opportunity the Earl of Morton, now regent, made use of to build two bulwarks across the high street, nearly opposite to the tolbooth, to defend the city from the fire of the castle.

On the first of January, early in the morning, the governor began to cannonade the city. Some of the cannon was pointed against the fish-market, then held on the high street; and the bullets falling among the fishers, scattered them about in a surprising manner, and even drove them up so high in the air, that they fell down upon the tops of the houses. This unusual spectacle brought a number of people out of their houses, some of them were killed and others dangerously wounded. Some little time afterwards, several houses were set on fire by shot from the castle, and burned to the ground; which greatly enraged the people against the governor.—A treaty was at last concluded between the leaders of the opposite factions; but Kirkaldy refused to be comprehended in it. The regent therefore solicited the assent of Queen Elizabeth, and Sir William Drury was again sent into Scotland with 1500 foot and a train of artillery. The castle was now besieged in form, and batteries raised against it in different places. The governor defended himself with great bravery for 33 days; but finding most of the fortifications demolished, the well chocked up with rubbish, and all supplies of water cut off, he was obliged to surrender. The English general, in the name of his mistress, promised him honourable treatment; but the Queen of England shamefully gave him up to the regent, by whom he was hanged.

Soon after this, the spirit of fanaticism, which somehow or other succeeded the Reformation, produced violent commotions, not only in Edinburgh, but thro' the whole kingdom. The foundation of these disturbances, and indeed of most others which have ever happened in Christendom on account of religion, was that pernicious maxim of Popery, that the church is independent of the state. It is not to be supped that this maxim was at all agreeable to the sovereign; but such was the attachment of the people to the doctrines of the clergy, that King James found himself obliged to compound matters with them. This, however, answered the purpose but very indifferently; and at last a violent uproar was excited. The King was then sitting in the Court of Seilson, which was held in the Tolbooth, when a petition was presented to him by six persons, lamenting the dangers which threatened religion; and being treated with very little respect by one Bruce a minister, his Majesty asked who they were that dared to convene against his proclamation? He was answer-
wished to return to their charges, and no others admitted
without his Majesty's consent; and that in the
election of their magistrates they should present a list
of the candidates to the King and his lords of council
and seifon, whose Majety and their lordships might
approve or reject at pleasure. To these conditions the
King now added some others; viz., that the houses
which had been poifoled by the ministers should be de-
livered up to the King; and that the clergy should
afterwards live dispersed through the town, every one
in his own parish: That the town-council house should
be appointed for accommodating the court of exche-
quifer; and that the town should become bound for the
safety of the lords of seifon from any attempts of the
burgesses, under a penalty of 40,000 merks; and, lastly,
that the town should immediately pay 20,000 merks
to His Majesty.

Upon these terms a reconciliation took place; which
appears to have been very complete, as the King not
only allowed the degraded ministers to be replaced, but
in 1610 conferred a mark of his favour on the town,
by allowing the provost to have a sword of state car-
ried before him, and the magistrates to wear gowns on
public occasions. In 1618 he paid his latest visit to this
city, when he was received with the most extravagant
pomp and magnificence. See Scotland.

The events which during this period, regard the Proceed-
ings internal police of the city, were principally the follow-
ing: After the unfortunate battle at Pinkie, the ma-
gistrates, probably apprehending that the only power
was enlarged by reason of the common calamity, pro-
ceeded in some respects in a very arbitrary manner;
forcing the inhabitants to furnish materials for the
public works; enjoining merchants to bring home sil-
ver to be coined at the mint; and ordering lanterns
be hung out at proper places to burn till nine at
night, &c. Another invasion from England being ap-
prehended in 1558, the city rafed 1450 men for its
defence, among whom were laid to have been 200
tailors, so that their profeflion seems to have been in
very flourishing state at that time. During the dis-
turbances which happened at the revolution, of which
a particular account is given under the article
Scotia, it was enacted, that the figure of St Giles
should be cut out of the town standard, and that of a
thistle inferted in its place. It was likewise enacted,
that none but those who professed the reformed reli-
ion should serve in any office whatever; and the bet-
ter to preserve that extraordinary appearance of faneti-
ty which was affected, a pillar was erected in the
North Loch, for the purpose of ducking fornicators.

In 1595, the boys of the High School rose against
their masters; and such was the barbarism of those
days, that one of these striplings shot a magistrate with
a pistol, who had come along with the rest to reduce
them to obedience. The reason of the uproar was,
that they were in that year refused two vacations,
which had been customary in former times: howev-
er, they were at first ordered to submitt, and ever since
have been allowed only one for about six weeks in
the autumn. The same year the house of one of the bal-
ilies was assaulted by the tradesmen sons, aifed by
journye men who had not received the freedom of the
town; he escaped with his life, but the offenders
were banished the city for ever.
Edinburgh.

In the beginning of the reign of Charles I. a perfect harmony seems to have subsisted between the court and the city of Edinburgh; for in 1627 king Charles I. presented the city with a new sword and gown to be worn by the provost at the times appointed by his father James VI. Next year he paid a visit to this capital, and was received by the magistrates in a most pompous manner; but soon after this the disturbances arose which were not terminated but by the death of that unfortunate monarch. These commenced on an attempt of Charles to introduce Episcopacy into the kingdom; and the first step towards this was the erection of the three Lothians and part of Berwick into a diocese, Edinburgh being the episcopal seat, and the church of St Giles the cathedral. An account of the disturbance occasioned by the reforted to town in such multitudes, that the people were not to be quieted. Next winter they nenced to leave the town in which the people were commanded, under severe penalties, to leave the city; and that which belonged to Edinburgh, the court of seccion was removed to Linlithgow. The populace and their leaders were so much enraged by the latter, that lord Traquair and some of the bishops narrowly escaped with their lives; and next year (1638) matters became still more serious. For now, the king having provoked his subjects throughout all Scotland with the innovations he attempted in religion, Edinburgh was made the general place of rendezvous, and the most formidable assemblages took place, an account of which has already been given under the article Britain. Each of the towns in Scotland had a copy; and that which belonged to Edinburgh, crowded with 5000 names, is still preserved among the records of the city. Notwithstanding this disagreement, however, the king once more visited Edinburgh in 1641, and was entertained by the magistrates at an expense of 12,000l. Scots. It does not appear that after this the city was in any way particularly concerned with the disturbances which followed either throughout the remainder of the reign of Charles I. the commonwealth, or the reign of Charles II. In 1680 the duke of York with his duchesses, the princes Anne, and the whole court of Scotland, were entertained by the city in the Parliament House, at the expense of 15,000l. Scots. At this time it is said that the scheme of building the bridge over the North Loch was first projected by the duke.

From the time that king James VI. paid his last visit to Edinburgh in 1618, till the time of the union in 1707, a considerable number of private regulations were made by the magistrates; some of them evidently calculated for the good of the city, others strongly characteristic of that violent spirit of fanaticism which prevailed so much in the last century. Among the former was an act passed in 1621, that the houses, instead of being covered with straw or boards, should have their roofs constructed of slate, tiles, or lead. This act was renewed in 1667; and in 1698 an act was passed regulating their height also. By this they were restrained to five stories, and the thickness of the wall determined to be three feet at bottom. In 1684 a lantern with a candle was ordered to be hung out in the first floor of every house in order to light the streets at night; and, Edinburgh, there were two coaches with four horses each ordered to be bought for the use of the magistrates; but it does not appear how long they continued to be used. In 1681 the court of seccion discontinued its sittings in summer; but as this was found to be attended with inconvenience, an act was passed for their reinstitution, which has continued ever since. During the time of the civil war in 1649, the city was visited by the plague, which is the last time that dreadful distemper hath made its appearance in this country. The infection was so violent, that the city was almost depopulated, the prisoners were discharged from the tolbooth, and an act was made for giving one Dr Johnes Politus a salary of 80l. Scots per month, for visiting those who were infected with the disease. In 1677 the first coffee-houses were allowed to be opened, but none without a licence: and the same year the town-council regulated the price of penny-weddings; ordaining the men to pay no more than two shillings, and the women 15pence; very extravagant prices having been exacted before.

In contradiction to these salutary acts, we may state those which show an extravagant desire of preserving the appearance of virtue in the female sex, as if it had been possible for others to inspire them with virtuous notions if they had not imbibed them of themselves. In 1633 an act of council was passed, by which women were forbidden to wear plaids over their faces, under penalty of five pounds and the forfeiture of the paid for the first fault. Banishment was the punishment of the third. The reason assigned for this act was, that matrons were not known from strumpets and loose women, while the plaid continued to be worn over the face. This act was renewed in 1637 and 1638. Succeeding town-councils continued to shew the same regard to these matters; for in 1695 they enacted that no inn-keeper, vintner, or ale-seller, should for the future employ women as waiters or servants, under the penalty of five shillings sterling for each.

The following anecdote may perhaps make the virtues of these legislators themselves wear a fulpicious aspect. In 1649 the city having borrowed L. 40,000 Scots, in order to raise their quota of men for his majesty, the payment of it was absolutely refused by the town-council when a demand was made for that purpose. That they might not, however, depend entirely upon their own opinion in a matter of such importance, they took that of the General Assembly upon the subject; and it was determined by these revered divines, that they were not in conscience bound to pay for an unlawful engagement which their predecessors had entered into. But in 1652, Cromwell's parliament who pretended to no less sanctity than they, declared themselves of very different opinion; and on the application of one of the creditors, forced them to repay the sum. The treatment which the brave marquis of Montrose infamous met with, like wise fixes an indelible stigma both upon the magistrate and clergy at that time. Having been put under sentence of excommunication, no peron was allowed to speak to him or do him the least office or friendship. Being met without the city by the magistrates and town-guard, he was by them conducted in a kind of gloomy procession through the streets bare-
Edinburgh, barreheaded, and in an elevated cart made for the purpose; the other prisoners walking two and two before him. At the time of his execution he was attended by one of the ministers, who, according to his own account, did not choose to return till he had seen him caden over the ladder.

The union in 1707 had almost produced a war between the two kingdoms which it was designed to unite: and on that occasion Edinburgh became a scene of the most violent disturbances, of which a particular account is given under the article Britain. During the time the act was passing, it was found absolutely necessary for the guards and four regiments of foot to do duty in the city. The disturbances were augmented by the disagreement of the two members of parliament; and notwithstanding the victory gained at that time by the court party, Sir Patrick Johnston the provost, who voted for the union, was obliged afterwards to leave the country. In 1715 the city remained faithful to the royal cause, and proper measures were taken for its defence. A committee of safety was appointed, the city guard increased, and 400 men relieved at the expense of the town. The trained bands likewise were ordered out, 100 of whom mounted guard every night; by which precautions the rebels were prevented from attempting the city: they however made themselves masters of the citadel of Leith; but fearing an attack from the duke of Argyre, they abandoned it in the night-time. A scheme was even laid for becoming masters of the castle of Edinburgh; for which purpose they bribed a sentinel with such speed, that he soon got out of hand, and in an elevated cart made for the purpose; the other prisoners walking two and two before him.

At that time the king was absent at Hanover, having left the regency in the hands of the queen; and the case of the unfortunate Porteous having been represented to her, she was pleased to grant him a reprieve: but such was the invertery of the people against him, that they determined not to allow him to avail himself of the royal clemency. On the day that had been appointed for his execution, therefore, a number of people assembled, that the gates of the city, and burnt the door of the prison, the fame which the mob would formerly have broke open in order to murder king James. They then took Porteous, whom it was found impossible to drag out of their hands, though every method that the magistrates could take for that purpose in such a confusion was made use of. It was even proved, that the member of parliament went to the commander in chief, and requested that he would send a party of soldiers to quell the disturbance, but was absolutely denied this request, because he could not produce a written order from the provost to this purport; which, in the confusion then existing in the city, could neither have been expected to be given by the provost, nor would it have been safe for any person to have carried it about him. Thus the unhappy victim was left in the hands of his executioners; and being dragged by them to the place destined for receiving his fate, he was hanged on a dyer's sign-post. As they had not brought a rope along with them, they broke open a shop where they knew they were to be had; and having taken out what they wanted, left the money upon the table, and retired without committing any other disorder.

Such an atrocious insult on government could not but be highly resented. A royal proclamation was issued, offering a pardon to any accomplice, and a reward of £200 to any person who would discover one of those concerned. The proclamation was ordered to be read from every pulpit in Scotland the first Sunday of every month for a twelvemonth: but so divided were the people in their opinion on the matter, that many of the clergy hesitated exceeding about complying with the royal order, by which they were brought in danger of being turned out of their livings: while those who complied were rendered so unpopular, that their situation was rendered still worse than the others. All the efforts of government, however, were insufficient to produce any discovery; by which, no doubt, the court were still more exasperated: and it was now determined to execute vengeance on the magistrates and city at large. Alexander Wilson, the provost at that time, was imprisoned three weeks before he
The city taken by the rebels in 1745.

In 1745, the city was invaded by the pretender's army; and on the 7th of September, the Netherbow gate being opened to let a coach pass, a party of Highlanders, who had reached the gate undiscovered, rushed in, and took possession of the city. The inhabitants were commanded to deliver up their arms at the guard placed at the guard house; a certain quantity of military stores was required from the city, under pain of military execution; and an assessment of 2s. 6d. upon the pound was imposed upon the city and liberties, for defraying that expense.

The pretender's army guarded all the avenues to the castle; but no signs of hostility ensued till the 25th of the month, when the garrison being alarmed from some unknown cause, a number of cannon were discharged at the guard placed at the West-port, but with very little effect. This gave occasion for an order to the guard at the weigh-house, to prevent all intercourse between the city and castle; and then the governor acquainted the provost by letter, that unless the communication was preferred, he would be obliged to dislodge the guard by means of artillery. A deputation was next sent to the Pretender; acquainting him with the danger the city was in, and intreating him to withdraw the guard. With this he refused to comply; and the Highland centinels firing at some people who were carrying provisons into the castle, a pretty smart cannonading ensued, which set on fire several houses, killed some people, and did other damage. The Pretender then contented to dismount the guard, and the cannonading ceased. After the battle of Culloden, the provost of Edinburgh was obliged to fland a very long and fever trial, first at London and then at Edinburgh, for not defending the city against the rebels; which, from the situation and extent of the walls, every one must have seen to be impossible.

During this trial a very uncommon circumstance happened; the jury having sat two days, infifted that they could fit no longer, and prayed for a short respite. As the urgency of the case was apparent, and both parties agreed, the court, after long reasoning, adjourned till the day following, taking the jury bound under a penalty of £500 each; when the court continued sitting two days longer, and the jury were one day inclufed. Edinburgh.

The event was, that the provost was exculpated.

After the battle of Culloden the duke of Cumberland caused fourteen of the rebel standards to be burned at the crofs; that of the Pretender was carried by the common executioner, the others by chimney-sweepers; the heralds proclaiming the name of the commanders to whom they belonged as they were thrown into the fire. At this time the city of Edinburgh felt a temporary inconvenience from the election of their magistrates not having taken place at the usual time; so that it became necessary to apply to his majesty for the restoration of the government of the city. This was readily granted, the burgeses being allowed a poll-tax; after which an entire new set of magistrates was returned, all of them friends to the house of Hanover; and soon after the freedom of the city in a gold box was presented to the duke of Cumberland.

With these transactions all interferences between government and the metropolis of Scotland were ended; the rest of its history therefore only consists of internal occurrences, the regulations made by its own magistrates for the benefit of the city, their applications to government for leave to improve it, or the execution of these improvements; of which we shall now give a brief detail.

In the year 1760, the city first bestowed a settled salary on the provost, in order to enable him to support himself and family in the dignity of first magistrate. This was at first £300, but has since been augmented to £500, which his lordship still enjoys. In 1718 it was recommended to the magistrates to distinguish themselves by wearing coats of black velvet, for which they were allowed £10; but this act being abrogated in 1754, gold chains were assigned as badges of their office, which they still continue to wear. Provost Kincaid happened to die in office in the year 1777; which being a very rare accident, perhaps the only one of the kind to be met with in the records of Edinburgh, he was buried with great solemnity, and a vast concourse of people attended.

Tumults have been frequent in Edinburgh, chiefly on account of the dearth of provisions. In 1740 Bell's mills were first attacked by the populace, and afterwards Leith mills: nor could the rioters be diffuaded till the military had fired among them, and wounded three, of whom one died; and it was found necessary to order some dragoons into the city in order to preserve tranquillity. In 1742 another violent tumult took place, owing to a custom of fealing dead bodies from their graves for anatomical purposes, which had then become common. The populace beat to arms, threatened destruction to the fargons; and in spite of all the efforts of the magistrates demolished the house of the head at St Cuthbert's. In 1756, new disturbances, which required the assistance of the military, took place: the cause at this time was the impressing of men for the war which was then commencing. A disturbance was likewise excited in 1760. This was occasioned by the footmen, who then were allowed to follow their masters into the playhouse, and now took upon them to disturb the entertainment of the company; the consequence of which was, that they were turned out, and have ever since been obliged to wait for their masters. In 1762 and 1765, the tumults on account of the price of proviions were renewed; many of the meal-mongers had their...
Edinburgh.

their houses broken open and their lofts destroyed.

The magistrates, as usual, were obliged to call in a party of dragoons to quell the disturbances; but at the same time the magistrates put an effective stop, as far as was in their power, to these proceedings for the future, they gave security, that people who brought grain or provision into the market should be secured in their property. Since that time there have been no tumults directly on the account of provisions; though in 1784 a terrible riot and attack of a distillery at Canonmills took place, on a supposition that the distillers enhanced the price of meal by using unmaltsed grain. The attack was repelled by the servants of the distillery; but the mob could not be quelled until the sheriff called the soldiers quartered in the castle to his assistance. The same night a party of rioters set out for Ford, a place ten miles to the southward, where there was likewise a large distillery; which, as there was none to make any resistance, they soon destroyed. One man was killed in this riot at Edinburgh by the fire of a servant of the distillery, and several of the rioters were afterwards secured and punished.

In the years 1778 and 1779 two very alarming disturbances happened, which threatened a great deal of bloodshed, though they were happily terminated without any bloodshed. The first was a mutiny of the earl of Seaforth's Highland regiment, who were at this time quartered in the castle. These having been ordered to embark, for some reason or other unanimously refused, and posted themselves on the top of Arthur's seat, where they continued for two days. Troops were collected to prevent their escape, and the inhabitants were ordered to keep within doors at the first toll of the great bell, which was to be a signal of violence about to take place; but fortunately all the fears, naturally arising from the expectation of this event, were dispelled by an accommodation. The other happened on account of the attempt to repeal the penal laws against the Papists; and was much more alarming than the other, as being the effect of a premeditated scheme and determined resolution to oppose government. On the 2d of February 1779 a mob assembled in the evening, burned a Popish chapel, and plundered it. Next day they went through their depredations; destroying and carrying off the books, furniture, &c. of several Popish priests and others of that persuasion. The riot continued all that day, though the assistance of the military was called in; but happily no lives were lost, nor was there any firing. The city was afterwards obliged to make good the damage sustained by the Catholics on this occasion, which was estimated at L. 1,500. This year also an unlucky accident happened at Leith. About 50 Highland recruits having refused to embark, a party of the South Fencibles was sent to take them prisoners. Unexpectedly, however, the Highlanders stood upon their defence; when, after some words, a firing commenced on both sides, and about one half of the Highlanders were killed and wounded, the remainder being taken prisoners and carried to the castle. Captain Mansfield and two or three privates were killed in this affray.

We shall close this history of Edinburgh with a general account of the improvements which have lately taken place in it, and of which a particular description will afterwards be given. These began in the year Edinburgh 1753, when the foundation stone of the Exchange was laid, at which time there was a grand procession, and the greatest concourse of people ever known in Edinburgh. A triumphal arch was erected for the purpose, through which the procession passed, and medals were distributed among the populace. In 1756 the high street was cleared by the removal of the crofts; though many regretted this, on account of its being a very ancient and elegant building. In the middle it had a unicorn placed on the top of a pillar 20 feet high; but this fine ornament was broken to pieces by the giving way of the tackle by which it was attempted to remove it. It is now again erected at Drum; a feat belonging to Lord Somerville, about four miles from Edinburgh. In 1763 the first stone of the north bridge was laid by Provost Drummond; and in 1767 an act of parliament was obtained for extending the royalty of the city over the fields to the northward, where the New Town is now situated. About the same time a spot of ground upon the south side of the town was purchased by a private person for L. 1,200, which being refused for building, gave rise to the incaresse of the town on that quarter; and this proceeded the more rapidly, as the houses built there were free from the duties imposed upon others subjected to the royalty. In 1774 the foundation of the Register-Office was laid. In 1784 the project for rendering the access to the town equally easy on both sides was begun to be put in execution by laying the foundation of the fourth bridge. At the same time a great improvement was made by reducing the height of the street several feet; all the way from the place where the crofs stood to the Netherbow; by which means the ascent is rendered more easy, not only for carriages, but also for persons who walk on foot. At the same time, the street was farther cleared by the removal of the town guard-house, which had long been complained of as an encumbrance. It is still farther in contemplation to remove the Luckenbooths; and when this is accomplished, with other improvements by which it most necessarily be accompanied, it is to be questioned whether any city in Britain will be able to vie with Edinburgh in elegance and beauty.

Having thus given a concise history of the city from its earliest foundation, we shall now proceed to describe it in its most improved state.

Edinburgh is situated upon a steep hill, rising from Description caff to west, and terminating in a high and inaccessible cliff, upon which the castle stands. At the east end of the city, or lower extremity of this hill stands the abbey of Holyrood-house, or king's palace, distant from the castle upwards of a mile; and betwixt which, along the top of the ridge, and almost in a straight line, runs the high street. On each side, and parallel to this street or hill, is another ridge of ground lower than that in the middle, and which does not extend far to the caff; that on the south being intercepted by Salisbury-eyocks and Arthur's-seat, a hill of about 800 feet of perpendicular height; and that on the north by the Calton-hill, considerably lower than Arthur's-seat; so that the situation of this city is most singular and romantic; the caff or lower part of the town lying between two hills; and the west or higher part rising up towards
Edinburgh, towards a third hill, little inferior in height to the highest of the other two, upon which, as has been observed, the castle is built, and overlooks the town.

The buildings of the town terminate at the distance of about 200 yards from the castle-gate: which space affords a most delightful as well as convenient and healthful walk to the inhabitants. The prospect from this spot is perhaps the finest any where to be met with, for extent, beauty, and variety.

In the valley or hollow betwixt the mid and the south ridges, and nearly parallel to the high-street, is another street called the Cowgate; and the town has now extended itself over most part of that south ridge also. Betwixt the mid and the north ridges was a loch, which, till of very late, terminated the town on that side. From the high-street towards the loch on the north, and Cowgate on the south, run narrow crofs streets or lanes, called wynds and defets, which grow steeper and steeper the farther west or nearer the castle; fo that, were it not for the closeness and great height of the buildings, this city, from its situation and plan, might naturally be expected to be the best aird, as well as the cleanest, in Europe. The former, notwithstanding these disadvantages, it enjoys in an eminent degree; but we cannot compliment it upon the latter, notwithstanding every possible means has been used by the magistrates for that purpose.

The steepness of the ascent makes the access to the high-street from the north and south very difficult; which was not greatly removed by the enlargement of the city. To remedy this inconvenience on the north, and with a view to extend the town on that quarter, a most elegant bridge has been thrown over the north-loch, which joins the north ridge to the middle of the high-street, by so easy an ascent as one in sixteen; and in pursuance of the design, a plan of a new town to the north was fixed upon, and is now nearly finished, with an elegance and taste that does honour to this country. In like manner, to facilitate the access from the south side, a bridge has been thrown over the valley through which the Cowgate runs; which, if not equally elegant with the north bridge, is certainly as convenient, as would have cut off not only all the Cowgate, but some part of the parliament-house; and being continued as far as the mint-clofe, it turned to the north-east, and connected itself with the buildings on the north-side of the high-street, where was the original Nether-bow Port, about 50 yards west from that which afterwards went by the same name.

Soon after the building of this wall, a new street was formed on the outside of it, named the Cowgate, which in the 16th century became the residence of the nobility, the senators of the college of justice, and other persons of the first distinction. After the fatal battle of Flodden, however, the inhabitants of the Cowgate became very anxious to have themselves defended by a wall as well as the rest. The wall of the city was therefore extended to its present limits. This new wall begins on the north-east side of the rock on which the castle is built, and to which the town-wall comes quite close. From thence it descends obliquely to the west-port; then ascends part of a hill on the other side, called the High Ridges; after which, it runs easterward with but little alteration in its course, to the Brifto and Potter-row ports, and from thence to the Pleasance. Here it takes a northerly direction, which it keeps from thence to the Cowgate-port; after which the inclosure is completed to the Netherbow by the hounes of St Mary's wynd. The original Netherbow port being found not well adapted for defence was pulled down, and a new one built in 1771 by the adherents of queen Mary. In 1606, the late handsome building was erected about 50 yards below the place where the former stood. It was two stories high, and had an elegant spire in the middle; but being thought to encumber the street, and the whole building being in a crazy fashion, it was pulled down by order of the magistrates in 1764.

In the original wall of Edinburgh there was, as has been already observed, a port on the castle-hill. On the extension of the wall, after building the hounes in the Cowgate, this port was pulled down. That in the upper or west bow stood for a much longer time, and was pulled down within the memory of some persons lately or perhaps still living. Besides thefe, there was a third, about 50 yards above the head of the Canongate; but whether there were any more, is uncertain. The porthor gates of the new walls were, 1. The West-port, situate at the extremity of the Grass-market, beyond which lies a suburb of the town and a borough of regality, called Portsburgh. Next to this is a wicket, struck out of the town-wall in 1744, for the purpose of making an easier communication between the town and the public walks in the meadows, than by Britofport. The next to this was Britof-port, built in 1515; beyond which lies a suburb called Britof-street. At a small distance from Britof was the Potter-row Port, which took this name from a manufactory of earthen ware in the neighbourhood. Formerly it was called Kirk of Field.
field the northward of the city; upon which advertisements were published by the magistrates, de-

fields to the northward of the city; upon which ad-

vertised proper plans to be given in. Plans were given in accordingly, and that designed by Mr James Craig architect was adopted. Immediately afterwards, peo-

ple were invited to purchase lots from the town-coun-

cil; and such as purchased became bound to conform to the rules of the plan. In the mean time, however, the town-council had secretly referred to themselves a privilege of departing from their own plan; which they afterwards made use of in such a manner as pro-
duced a law-fuit. According to the plan held forth to the purchasers, a canal was to be made through that place where the north-loch had been, and the bank on the north side of it laid out in terraces: but instead of this, by an act of council, liberty was referred to the town to build upon this spot; and therefore, when many gentlemen had built genteel houses in the New town on faith of the plan, they were surprized to find the spot appointed for terraces and a canal, beginning to be covered with mean irregular buildings, and work-houses for tradesmen. This deviation was im-

mediately complained of; but as the magistrates showed no inclination to grant any redress, a profecution was commenced against them before the Lords of Sef-

fion. In that court the cause was given against the purchasers, who thereupon appealed to the House of Lords. Here the sentence of the Court of Seffion was reversed, and the cause remitted to the consideration of their Lordships. At last, after an expensive con-
test, matters were accommodated. The principal term of accommodation was, that some part of the ground was to be laid out in terraces and a canal; but the time of disappointing it in that manner, was refer-
ed to the Lord President of the Court of Seffion and the Lord Chief Baron of the Exchequer.—The fall of part of the bridge, hereafter mentioned, proved a very considerable disadvantage to the New Town; as it necessarily induced a suspicion that the passage, by means of the bridge, could never be rendered safe. An oversight of the magistrates proved of more essential detriment. A piece of ground lay to the south-

ward of the old town, in a situation very proper for build-
ing. This the magistrates had an opportunity of purchasing for 1200l; which, however, they ne-

glected, and it was bought by a private person, who immediately feued it out in lots for building, as has been already mentioned. The magistrates then began to see the confluence, namely, that this spot being free from the duties to which the royalty of Edinburgh is subject, people would choose to reside there rather than in the New Town. Upon this they offered the purchaser 2000l, for the ground for which he had paid 1200l; but as he demanded 20,000l, the bargain did not take place. Notwithstanding these discouraging-
ments, the New Town is now almost finished; and from the advantages of its situation, and its being built according to a regular plan, it hath undoubtedly a supe-

riority over any city in Britain. By its situation, how-

ever, it is remarkably exposed to storms of wind, which at Edinburgh, sometimes rage with uncommon violence.

It has three streets, almost a mile in length, running from east to west, intersected with cross-streets at proper


distances.
pointed for the governor, as the latter never inhabits Edinburgh.

There is also a fort-major, a store-keeper, master gunner, and chaplain; but as this last does not reside in the castle, worship is seldom performed in the chapel.

The parliament-house was formerly included in the great square on the top, and theroyal gardens were in the marsh afterwards called the North Bosch; the king’s stables being on the south side, where the houses still retain the name, and the place where the barns were still retain the name of Castle-barns.

The castle is defended by a company of invalids, and four or five hundred men belonging to some marching regiment, though it can accommodate 1000, as above-mentioned; and this number has been sometimes kept in it. Its natural strength of situation was not sufficient to render it impregnable, even before the invention of artillery, as we have already observed; much less would it be capable of securing it against the attacks of a modern army well provided with cannon. It could not, in all probability, withstand, even for a few hours, a well directed bombardment: for no part but the powder-magazine is capable of resisting these destructive machines; and the splinters from the rock on which the castle is built, could not fail to render them still more formidable. Besides, the water of the well, which is very bad, and drawn up from a depth of 100 feet, is apt to embitter on the continued discharge of artillery, which produces a concussion in the rock.

The Caille. This stands on a high rock accessible only on the east side. On all others it is very steep, and in some places perpendicular. It is about 300 feet high from its base: so that, before the invention of artillery, it might well have been deemed impregnable; though the event showed that it was not. — The entry to this fortrefs is defended by an outer barrier of palisadoes; within this is a dry ditch, draw-bridge, and gate, defended by two batteries which flank it; and the whole is commanded by a half-moon mounted with brass cannon, carrying balls of 12 pounds. Beyond these are two gate-ways, the first of which is very strong, and has two portcullises. Immediately beyond the second gate-way, on the right hand, is a battery mounted with brass cannon, carrying balls of 12 and 18 pounds weight. On the north side are a mortar and some gun batteries. — The upper part of the castle contains a half-moon battery, a chapel, a parade for exercise, and a number of huts in the form of a square, which are laid out in barracks for the officers. Besides these there are other barracks sufficient to contain 1000 men; a powder magazine bomb-proof; a grand arsenal, capable of containing 8000 stand of arms; and other apartments for the same use, which can contain 25,000 more; so that 35,000 stand of arms may be conveniently lodged in this castle.

On the east side of the square abovementioned, were formerly royal apartments; in one of which king James VI. was born, and which is still shown to those who visit the castle. In another, the regalia of Scotland were deposited on the 26th of March 1707, and are said to be still kept there; but they are never shown to any body. Hence a suspicion has arisen that they have been carried to London; which is the more confirmed, as the keeper of the jewel-office in the tower of London shows a crown, which he calls that of Scotland; and it is certain that the door of what is called the Crown-room has not been publicly known to be opened since the union.

The governor of the castle is generally a nobleman, whose place is worth about 1000l. a-year; and that of deputy-governor, 500l. This last resides in the house.
Edinburgh. roof flat; but at each end the front projects, and is ornamented with circular towers at the angles. Here the building is much higher, and the roof of the palace is three stories in height. The north-west towers were built by James V. for his own residence: his name is still to be seen below a niche in one of these towers. During the minority of queen Mary, this palace was burned by the English; but soon after repaired and enlarged beyond its present size. At that time it consisted of five courts, the most westerly of which was the largest. It was bounded on the east by the front of the palace, which occupied the same space it does at present; but the building itself extended further to the south. At the north-west corner was a strong gate, with Gothic pillars, arches, and towers, part of which was not long ago pulled down. Great part of the palace was burnt by Cromwell's soldiers; but it was repaired and altered into the present form after the Restoration. The fabric was planned by Sir William Bruce a celebrated architect, and executed by Robert Mylne master. The entrance of the palace was fitted up as an asylum for insolvent debtors; and adjoining to it is an extensive park, all of which is a sanctuary.

The abbey church was formerly called the monastery of Holyrood-houfe, and built by king David I. in 1128. He gave it the name of Holyrood-houfe, in memory, as is said, of his deliverance from an enraged hart, by the miraculous interposition of a crofs from heaven. This monastery he gave to the canons regular of St Augustine: on whom he also bequeathed the church of Edinburgh castle, with those of St Cuthbert's, Corforphin, and Liberton, in the thre of Mid-Lothian, and of Airthin Stirlingshire; the priories of St Mary's sile in Galloway, of Blantyre in Clydesdale, of Rowadill in Rois, and three others in the Western Isles. To them he also granted the privilege of erecting a borough between the town of Edinburgh and the church of Holyrood-houfe. From these canons it had the name of the Canongate, which it still retains. In this new borough they had a right to hold markets. They had also portions of land in different parts, with a most extensive jurisdiction, and right of trial by duel, and fire and water ordeal. They had also certain revenues payable out of the exchequer and other funds, with libings, and the privilege of erecting mills on the water of Leith, which still retain the name of Canow-mills. Other grants and privileges were bestowed by succeeding sovereigns; so that it was deemed the richest religious foundation in Scotland. At the Reformation, its annual revenues were, 442 rolls of wheat, 640 rolls of bear, 560 rolls of oats, 500 capons, two dozen of hens, as many salmon, 12 loads of salt; besides a great number of swine, and about 250l. sterling in money. At the Reformation, the superintendence of North Leith, part of the Pleasance, the barony of Broughton, and the Canongate, was vested in the earl of Roxburgh; and were purchased from him by the town-council of Edinburgh in 1636. In 1544, the church suffered considerably by the invasion of the English; but was speedily repaired. At the Reformation, king Charles II. ordered the church to be set apart as a chapel-royal, and prohibited its use as a common parish church for the future. It was then fitted up in a very elegant manner. A throne was erected for the sovereign, and 12 stalls for the knights of the order of the thistle; but as masts had been celebrated in it in the reign of James VII. and it had an organ, with a spire, and a fine chime of bells on the west side, the Presbyterians at the revolution entirely destroyed its ornaments, and left nothing but the bare walls.—Through time, the roof of the church became ruinous; on which the duke of Hamilton represented its condition to the barons of exchequer, and craved that it might be repaired. This request was complied with: but the architect and mason who were employed, covered the roof with thick flag-stones, which soon impaired the fabric: and on the 2d of December 1768, the roof fell in. Since that time, no attempt has been made to repair it, and it is now entirely fallen to ruin.

The ruins of this church, however, are still sufficient to discover the excellency of the workmanship. Here some of the king's of Scotland are interred; and an old kind of curiosity has been the occasion of exposing some bones laid to the test of lord Darnley's and a contingent of Roxburgh who died several hundred years ago. Thos. died to belong to the former were very large, and the latter had some flesh dried upon them. The chapel was fitted up in the elegant manner above-mentioned by James VII. but such was the enthusiasm of the mob, that they not only destroyed the ornaments, but tore up even the pavement, which was of marble.

To the eastward of the palace is the bowling-green, now entirely in disorder; and behind it is a field called St Ann's Tards. Beyond this is a piece of ground called the King's Park; which undoubtedly was formerly overgrown with wood, though now there is not a single tree in it. It is about three miles in circumference; and is first inclosed by James V. It contains the rocky hills of Aventures Seat and Salisbury Craigs, which last afford an inexhaustible stone quarry; and upon the north side of the hill stands an old ruinous chapel, dedicated to St Anthony. The stones are used in building, as well as for paving the streets and highways. The park was mortgaged to the family of Haddington for a debt due to them; and by the present earl has been divided into a number of inclosures by stone dykes raised at a considerable expense. A good number of sheep and some black cattle are fed upon it; and it is now rented at £500 l. annually.

3. St Giles Church is a beautiful Gothic building, measuring in length 206 feet. At the west end, its breadth is 110; in the middle, 129; and at the east end, 76 feet. It has a very elevated situation, and is adorned with a lofty square tower; from the sides and corners of which rise arches of figured stonework: these meeting with each other in the middle, complete the figure of an imperial crown, the top of which terminates in a pointed spire. The whole height of this tower is 161 feet.

This is the most ancient church in Edinburgh. From a passage in an old author called Simonei Daudensfis, some conjecture it to have been built before the year 854; but we do not find express mention made of it before 1239. The tutelar saint of this church, and of Edinburgh, was St Giles, a native of Greece. He lived in the sixth century, and was defended of an illustrious family. On the death of his parents, he gave
Edinburgh gave all his estate to the poor; and travelled into France, where he retired into a wilderneas near the confluence of the Rhone with the sea, and continued there three years. Having obtained the permission of the ordinary faculty, various miracles were attributed to him; and he founded a monastery in Languedoc, known long after by the name of St Giles'.—In the reign of James II. Mr Preston of Gorton, a gentleman whose descendents still posses an estate in the county of Edinburgh, got possession of the arm of this faint; which relic he bequeathed to the church of Edinburgh. In gratitude for this donation, the magistrates granted a charter in favour of Mr Preston's heirs, by which the nearest heir of the name of Preston was entitled to carry it in all processions. At the same time, the magistrates obliged themselves to found an altar in the church of St Giles's, and appoint a chaplain for celebrating an annual mass for the soul of Mr Preston; and likewise, that a tablet, containing his name, and an account of his pious donation, should be put up in the chapel.—St Giles's was first simply a parochial church; of which the bishop of Lindisfarne or Holy Island, in the county of Northumberland, was patron. He was succeeded in the patronage by the abbot and canons of Dunfermline, and they by the magistrates of Edinburgh. In 1466, it was erected into a collegiate church by James III.—At the Reformation, the church was, for the greater convenience, divided into several parts. The four principal ones are appropriated to divine worship, the lefser ones to other purposes. At the same time the religious vestiments belonging to this church were zealed by the magistrates. They were,—St Giles's arm, enshrined in silver, weighing five-pounds three ounces and a half; a silver chalice, or communion-cup, weighing twenty ounces; the great chasubil for communion-cup, with golden weike and fones; two cruets of twenty ounces; a golden bell, with a heart, of four ounces and a half; a golden unicorn; a golden pix, to keep the host; a small golden heart, with two pearls; a diamond ring; a silver chalice, patiner, and spoon, of thirty ounces and a half; a communion-table-cloth of gold brocade; St Giles's coat, with a little piece of red velvet which hung at his feet; a round silver chisbif; two silver censers, of three pounds fifteen ounces; a silver chalice, with its base, weighing thirteen ounces and a half; a triangular silver lamp; two silver candlesticks, of seven pounds three ounces; other two, of eight pounds thirteen ounces; a silver chalice gilt, of twenty ounces; a silver chalice and crofs, of seventy-five ounces; besides the priefts robes, and other vestments of gold brocade; crimson velvet embroidered with gold and green damask.—These were all fold, and part of the money applied to the repairs of the church; the rest was added to the funds of the corporation.

In the fullest of St Giles's church are three large bells brought from Holland in 1621; the biggest weighing 2000lb. the second 700, and the third 500. There are also a fet of mufic bells, which play every day between one and two o'clock, or at any time in the cafe of rejoicings. The principal division is called the High Church, and has been lately repaired and new feated. There is a very elegant and finely ornamented feat for his majefly, with a canopy supported by four Corinthian pillars decorated in high taff.]}

This fet is used by the king's commissioner during the Edinburgh, time the General Assembly sits. On the right hand is a feat for the lord high confable of Scotland, whose place it is to keep the peace within doors in his majefty's prefence; and it being the duty of the earl marshal to do the fame without. The feats belonging to the lords of council and feflion are on the right of the lord high confable; and on the left of the throne was a feat for the lord high chancellor of Scotland; but that office being now abolished, the feat is occupied by others. On the left of this is the barons of exchequer; and, to the left of them, the lord provost, magiftrates, and town-council. The pulpit, king's feat, and galleries, are covered with crimson velvet with gold and silver fringes.

The aile of St Giles's church is fitted up with feats for the general assembly who meet here; and there is a throne for his majefty's commissioner with a canopy of crimson silk damask, having the king's arms embroidered with gold, prefented by the late lord Cathcart to his successor in office. In this church is a monument dedicated to the memory of lord Napier, baron of Merchilton, well known as the inventor of logarithms; a second to the earl of Murray, regent of Scotland during the minority of James VI; and a third to the great marquis of Monrope.

The Parliament House, in the great hali of which the Scottish parliament used to assemble, is a magnificent building. The hall is 123 feet long 42 broad, with a fine arched roof of oak, painted and gilded. In this the lawyers and agents now attend the courts, and single judges sit to determine causes in the first instance, to prepare them for the whole-court, who fit in an inner room formerly appropriated to the privy-council. In a niche of the wall is placed a fine marble statue of precedent Forbes, erected at the expense of the faculty of advocates. There are also full length portraits of king William III. queen Mary his confort, and queen Anne, all done by Sir Godfrey Kneller; also of George I. John duke of Argyle, and Archibald duke of Argyle, by Mr Aikman of Cairnley.

Above floors are the court of exchequer and treasury chamber, with the different offices belonging to that department; and below is one of the most valuable libraries in Great Britain, belonging to the faculty of advocates. Besides 50,000 printed volumes, here are many scarce and valuable manuscripts, medals, and coins; here is also an entire mummy in its original chaff, prefented to the faculty (at the expense of 300l.) by the earl of Morton, late presidet of the royal society. As these rooms are immediately below the hall where the parliament fat, they are subject to a search by the lord high confable of Scotland ever since the gun-power plot; and this is specified in the gift from the city to the faculty. This library was founded, in the year 1692, by Sir George Mackenzies lord advocate. Among other privileges, it is intitled to a copy of every book entered in Stationer's hall. Before the great door is a noble equestrian statue of Ch. II. the proportions of which are reckoned exceedingly fair. Over the entrance are the arms of Scotland, with Mercy and Truth on each fide for supporters.

The court of feflion, the supreme tribunal in Scotland, consists of 15 judges, who sit on a circular bench, clothed in purple robes turned up with crimson velvet. Six of these are lords of the judiciary, and go the cir-
Edinburgh, court twice a-year; but, in that capacity, they wear scarlet robes turned up with white laces.

5. The Tolbooth was erected in 1561, not for the purposes merely of a prison, but likewise for the accommodation of the parliament and other courts; but it has since become so very unfit for any of these purposes, that it is now proposed to pull it down and rebuild it in some other place, especially as it is very inconvenient in its present situation on account of its incumbering the street. The provost is captain of the tolbooth, with a gaoler under him: and the latter has a monopoly of all the provisions for the prisoners; a circumstance which must certainly be considered as a grievous oppression, those who are least able to purchase them being thus obliged to do so at the highest price. There is a chaplain who has a salary of 30l. a-year.

6. There is a hall in the Writers Court belonging to the clerks to his majesty's signet, where there is also an office for the business of the signet. The office of keeper of the signet is very lucrative, and he is allowed a depute and clerks under him. Before any one enters into this society he must attend the college for two years, and serve five years as an apprentice to one of the society. There is a good library belonging to this hall, which is rapidly increasing, as every one who enters must pay 10l. towards it. He pays also 100l. of apprentice-fee, and 100l. when he enters.

7. The Exchange is a large and elegant building, with a court of about 90 feet square in the middle. On the north side are piazzas where people can walk under cover, the other three sides being laid out in shops; but the merchants have never made use of it to meet in, still standing in the street as formerly. The back part of the building is used for the general custom-house of Scotland, where the commissioners meet to transact business. They have above 20 offices for the different departments, to which the access is by a hanging stair 60 feet in height. In looking over the window before he ascends this stair, a stranger is surprised to find himself already 40 feet from the ground, which is owing to the declivity on which the Exchange is built. For the custom-house rooms the city receives a rent of 11l. per day.

The Exchange Office for the improvement of fisheries and manufactures in Scotland is in the south-west corner of the exchange; the fund under their management being part of the equivalent money given to Scotland at the Union. This is distributed in premiums amongst those who appear to have made any considerable improvements in the arts.

7. The North Bridge, which forms the main passage of communication between the Old and New Towns, was founded, as has already been observed, in 1763 by Provost Drummond; but the contract for building it was not signed till August 21st 1765. The architect was Mr. William Mylne, who agreed with the town-council of Edinburgh to finish the work for 16,140l. and to uphold it for 10 years. It was also to be finished before Martinmas 1769; but on the 3d of August that year, when the work was nearly completed, the vaults and side-walls on the south fell down, and five people were buried in the ruins. This misfortune was occasioned by the foundation having been laid, not upon the solid earth, but upon the rubbish of the houses which had long before been built on the north side of Edinburgh on the high-street, and which had been thrown out into the hollow to the northward. Of this rubbish there were no less than eight feet between the foundation of the bridge and the solid earth. Besides this deficiency in the foundation, an immense load of earth which had been laid over the vaults and arches in order to raise the bridge to a proper level, had no doubt contributed to produce the catastrophe abovementioned. The bridge was repaired by pulling down some parts of the side-walls, and afterwards rebuilding them; strengthening them in others with chain-bars; removing the quantity of earth laid upon the vaults, and supplying its place with hollow arches, &c. The whole was supported at the south end by very strong buttresses and counterforts on each side; but on the north it has only a single support. The whole length of the bridge, from the High-street in the Old Town to Prince's-street in the New, is 115 feet; the total length of the piers and arches is 310 feet. The width of the three great arches is 72 feet each; of the piers, 13½ feet; and of the small arches, each 20 feet. The height of the great arches, from the top of the parapet to the base, is 68 feet; the breadth of the bridge within the wall over the arches is 40 feet, and the breadth at each end 50 feet. On the southern extremity of this bridge stands the General Post Office for Scotland; a neat plain building, with the proper number of apartments for the business, and a house for the secretary.

The communication between the two towns by means of this bridge, though very complete and convenient for such as lived in certain parts of either, was yet found insufficient for those who inhabited the western districts. Another bridge being therefore necessary, it was proposed to fill up the valley occasionally with the rubbish dug out in making the foundations of houses in the New Town; and so great was the quantity, that this was accomplished so as to be fit for the passage of carriages in little more than four years and an half.

8. The South Bridge is directly opposite to the other, so as to make but one street, crossing that called the High-street almost at right angles. It consists of 19 arches of different sizes; but only one of them is possible, viz. the large one over the Cowgate; and even this is small in comparison with those of the North Bridge, being more than 30 feet wide and 3½ feet high. On the south it terminates at the University on one hand, and the Royal Infirmary on the other. The Tron Church, properly called Christ Church, stands at the eastern extremity, facing the High-street, and in the middle of what is now called Hunter's Square, in memory of the late worthy chief magistrate who planned these improvements, but did not live to see them executed. On the west side of this square the Merchant Company have built a very handsome hall for the occasional meetings of their members. This bridge was erected with a design to give an easy access to the great number of streets and squares on the south side, as well as to the country on that quarter from whence the city is supplied with coals. The street on the top is supposed to be as regular as any in Europe; every house being of the same dimensions, excepting that between every two of the ordinary construction there is one with a pediment on the top, in order to prevent that
Edinburgh, the sumptuosity of appearance which would otherwi 
se take place. So great was the rage for purchasing ground on each side of this bridge for building, that the areas fold by public auction at 50l. per foot in front. By this the community will undoubtedly be considerable gainer; and the proprietors hope to indemnify themselves for their extraordinary expence by the vast sale of goods suppos'd to attend the shops in that part of the town; though this seems somewhat more dubious than the former.

9. The Concert Hall, called also St Cecilia's Hall, stands in Niddery's-street; and was built in 1763, after the model of the great opera-theatre in Parma. The plan was drawn by Sir Robert Mylne, architect of Blackfriars bridge. The musical room is of an oval form, the ceiling being a concave elliptical dome, lighted from the top by a lantern. The seats are ranged in the form of an amphitheatre; and are capable of containing 500 persons, besides leaving a large area in the middle of the room. The orchestra is at the upper end, and is terminated by an elegant organ.

The musical society was first instituted in the year 1728. Before that time, several gentlemen had formed a weekly club at a tavern kept by one Steil, a great lover of music, and a good finger of Scots songs. Here the common entertainment consisted in playing on the harpsichord and violin the concertos and sonatas of Handel, just then published. The meeting, however, soon becoming numerous, they instituted, in the year 1732, the society of 70 members, for the purpose of holding a weekly concert. The affairs of the society are regulated by a governor, deputy-governor, treasurer, and five directors, who are annually chosen by the members. The meetings have been continued ever since that time on much the same footing as at first, and the number of members is now increased to 200. The weekly concerts are on Friday; the tickets being given gratis by the directors, and attendance paid in the first place to strangers. Oratorios are occasionally performed throughout the year; and the principal performers have also benefit concerts. The band are excellent in their several departments; and the members have been always of a very high degree of performance, and have taken their part in the orchestra. There are always many applications on the occasion of a vacancy by the death of one of the members or otherwise; and such is generally the number of candidates, that it is no easy matter to get in.

10. The University. In the year 1581, a grant was obtained from king James VI. for founding a college or university within the city of Edinburgh; and the citizens, aided by various donations from well disposed persons, purchased a situation for the intended new college, consisting of part of the areas, chambers, and church of the collegiate provostship and prebends of the Kirk-a-field, otherwise called Temploio et Praefetura Sandula Mariae in compiti, lying on the south side of the city. Next year, a charter of confirmation and erection was obtained also from king James VI. from which the college to be built did afterwards derive all the privileges of an university.

In 1582, the provost, magistrates, and council, the patrons of this new institution, prepared the place in the best manner they could for the reception of teachers and students; and in the month of October the same year, Robert Rollock, whom they had invited from a professorship in St Salvator's College in the university of St Andrew's; began to teach in the new college of Edinburgh. Other professors were soon after elected; and in the year 1586, Rollock was appointed principal of the college, and the following year also professor of divinity, immediately after he had conferred the degree of M. A. on the students who had been under his tuition for four years. The offices of principal and professor of divinity remained united till the year 1620.

In the year 1617, king James VI. having visited Scotland after his accession to the crown of England, commanded the principal and regents of the college of Edinburgh to attend him in Stirling castle; and after they had there held a solemn philosophical disputation in the royal presence, his majesty was so much satisfied with their appearance, that he desired their college for the future might be called The College of King James, which name it still bears in all its diplomas or public deeds.

For several years the college consisted only of a principal, who was also professor of divinity, with four regents or professors of philosophy. Each of these regents instructed one class of students for four years, in Latin, Greek, school logic, mathematics, ethics, and physics, and graduated them at the conclusion of the fourth course. A professor of humanity or Latin was afterwards appointed, who prepared the students for entering under the tuition of the regents; also a professor of mathematics, and a professor of Hebrew or Oriental languages. It was not till about the year 1710 that the four regents began to be confined each to a particular profession; since which time they have been commonly styled Professors of Greek, Logic, Moral Philosophy, and Natural Philosophy. The first medical professors instituted at Edinburgh, were Sir Robert Sibbald and Doctor Archibald Pitcairn, in the year 1687. These, however, were only titular pro ... See Col- lectors; and for 30 years afterwards, a summer-lecture ... Colle- 

Philo-
Edinburgh of divinity, who pay nothing to this library, have one belonging to their own particular department.

Here are shown two celts; one almost as thin as paper, pretended to be that of the celebrated George Buchanan, and, by way of contrast, another said to have been that of an idiot, and which is excessively thick. Here also are preserved the original proclamations against the council of Constance for burning John Hus and Jerome of Parma in 1417, the original charter of queen Mary with the dauphin of France, and some valuable coins and medals. There are also several portraits; particularly of Robert Pollock the first principal of the university, king James VI. Lord Napier the inventor of logarithms, John Knox, principal Carolinus, Mr Thomson the author of the Seasons, &c.

The museum contains a good collection of natural curiosities, the number of which is daily increasing. The anatomical preparations are worth notice, as are also those belonging to the professor of midwifery.

The celebrity of this college has been greatly owing to the uniform attention of the magistracy in filling up the vacant chairs with men of known abilities in their respective departments. Greatly to their honour, too, they have been no less attentive to the instituting of new professorships from time to time as the public seemed to demand them. In the year 1790, the Senate Academicus consisted of the following members, arranged according to the different faculties.

University of Divinity and Belles Lettres.

Andrew Dalziel, A. M. Professor of Rhetoric and Belles Lettres.

William Greenfield, A. M. Professor of Rhetoric and Belles Lettres.

John Playfair, A. M. Professor of Mathematics.

Robert Blair, M. D. Regius Professor of Practical Astronomy.

James Finlayson, A. M. Joint Professor of Logic.

Andrew Coventry, M. D. Professor of Agriculture.

Andrew Fife, Principal Janitor and Maser.

The number of students during the last session of the college, from October 10, 1789 to May 6, 1790, was nearly as follows:

- Students of Divinity: 120
- Students of Law: 300
- Students of Phyic: 440
- General Classes: 420

In all 1090

The old buildings being very mean, and unfit for the reception of so many professors and students, and quite unsuitable to the dignity of such a flourishing university, as well as inconsistent with the improved state of the city, the Lord Provost, Magistrates, and Council, set on foot a subscription for erecting a new structure, according to a design of Robert Adam, Esq.; architect. Part of the old fabric has in consequence been pulled down, and the new building is already in considerable forwardness. The foundation-stone was laid on Monday the 16th of November, with great solemnity, by the Right Hon. Francis Lord Napier, grand master mason of Scotland, in the presence of the Right Hon. the Lord Provost, Magistrates, and Town-Council of the city of Edinburgh, with the Principal, Professors, and Students of the university of Edinburgh, a number of Nobility and Gentry, and the Masters, Officers, and Brethren, of all the lodges of free masons in the city and neighbourhood, who marched in procession from the Parliament-House down the High-Street. After the different masonic ceremonials were performed, two crystal-bottles, cast on purpose at the glass-house of Leith, were deposited in the foundation-stone. In one of these were put different coins of the present reign, each of them being previously enveloped in crystal, in such a ingenious manner, that the legend on the coins could be distinctly read without breaking the crystal. In the other bottle were deposited seven rolls of vellum, containing a short account of the original foundation and present state of the university, together with several other papers, in particular the different newspapers, containing advertisements relative to the college, &c., and a list of the names of the Principal and Professors, also of the present...
The university of Edinburgh, like the others in this Edinburgh, kingdom, sends one member to the General Assembly of the church of Scotland; and the widows of the professors have a right to the funds of those of ministers, the professors being trustees on that fund, with the prebendry of Edinburgh.

11. The Royal Infirmary was first thought of by the college of physicians in 1725. A fishing company happened to be dissolved at that time, the partners contributed some of their stock towards the establishment of the infirmary. A subscription was also set on foot, and application made to the General Assembly to recommend the same throughout their jurisdiction. This was readily complied with, and the assembly passed an act for that purpose; but very little regard was paid to it by the clergy. Notwithstanding this, however, 2000l. being procured, a small house was opened for the reception of the sick poor in August 1729. In 1736, the contributors towards the infirmary were erected into a body corporate by royal statute; and after this the contributions increased very considerably: by which means the managers were enabled to enlarge their scheme from time to time; and at last to undertake the present magnificent structure, the foundation of which was laid in 1738. During 25 years, when this institution was in its infancy, Lord Hopetoun bestowed upon it an annuity of 400l. In 1750, Doctor Archibald Ker bequeathed to this incorporation 200l. a-year in the island of Jamaica. In 1759, the lords of the treasury made a donation to it of 8000l. which had been appointed for the support of invalids. In return for this, the managers of the infirmary constantly keep 60 beds in readiness for the reception of sick soldiers. This year also sick servants began to be admitted into the infirmary, and a ward was fitted up for their reception.

This institution, however, was more indebted to George Drummond, Esq. than to any other person. He was seven times chosen lord provost of Edinburgh; and always directed his attention to the improvement of the city, particularly that of the royal infirmary. So able were the managers of their obligations to him, that, in their days, the managers elected a burs of him with this inscription, "George Drummond, to whom this country is indebted for all the benefit which it derives from the Royal Infirmary."—In 1748, the stock of the infirmary amounted to 5000l; in 1755, to 7076l. besides the estate left by Doctor Ker; in 1764, to 23,426l.; and in 1778, to 27,074l.

The royal infirmary is attended by two physicians chosen by the managers, who visit their patients daily in presence of the students. All the members of the college of surgeons are also obliged to attend in rotation, according to seniority. If any surgeon declines attendance, he is not allowed to appoint a deputy; but the patients are committed to the care of one of four assistant surgeons, chosen annually by the managers. From the year 1762 to 1769, there were admitted 6261 patients; which number added to 109 who were in the hospital at the commencement of the year 1762, made, in all, 6370. Of these, 4395 were cured; 338 died: the rest were either relieved, disfigured, incurable, for irregularities, or by their own desire, or remained in the hospital.—From 1770 to 1775, the patients annually admitted into the infirmary were, at an average, 1573; of whom 63 died. In 1776, there were admitted 1608.
In the year 1766, there were admitted 1822 patients: Of these 1534 were cured; 166 relieved; 84 died; the rest were either relieved, dismissed incurable, for irregularities, or by their own desire.

The building consists of a body and two wings, each of them three stories high, with an attic story and garrets, and a very elegant front. The body is 250 feet long, and 36 broad in the middle, but at the ends only 24 feet broad. There is a bust of King George II. in a Roman dress, above the great door. The wings are 70 feet long and 24 broad. In the centre is a large stair-case, to which the ladder chairs may be carried up. In the different wards, 228 patients may be accommodated, each in a different bed. There are cold and hot baths for the patients, and also for the citizens; and to these last the patients are never admitted.

Besides the apartments necessary for the sick, there are others for the officers and servants belonging to the house. There are likewise rooms for the managers, a confiding room for the physicians and surgeons, a waiting-room for the students, and a theatre that will hold upwards of 200 people for performing chemical operations. There is a military ward, supported by the interest of the 8000l. already mentioned; and in consequence of which a small guard is always kept at the infirmary. The wards for sick servants are supported by collections at the church doors. Besides the attendance of the royal college of surgeons by rotation, as has already been mentioned, there are two physicians belonging to the house, who are elected by the managers, and have a small salary; there is likewise a house-surgeon and apothecary. Students who attend the infirmary pay 3l. 3s. annually, which brings in a revenue of about 500l. towards defraying the expense of the house. Two wards are set apart for the patients whose cases are supposed to be most interesting, and the physicians give lectures upon them.

12. The Public Dispensary was founded by Dr. Duncan in 1776, for the poor whose diseases are of such a nature as to render their admission into the infirmary either unnecessary or improper. Here the patients receive advice gratis four days in the week; a registrar is kept of the diseases of each, and of the effects produced by the medicines employed. All patients not improper for dispensary treatment are admitted on the recommendation of the elder or church-warden of the parish where they reside. The physicians officiate and give lectures gratis; so that the apothecary whose lodges in the house, and the medicines, are the only expenses attending this useful institution. The expense of the whole is defrayed by public contributions, and from a small annual fee paid by the students who attend the lectures. It is under the direction of a president, two vice-presidents, and 20 directors, elected annually from among the contributors. One guinea intitles a contributor to recommend patients and be a governor for two years, and five guineas gives the same privilege for life.

13. The High School. The earliest institution of a grammar-school in Edinburgh seems to have been about the year 1540. The whole expense bestowed upon the first building of this kind amounted only to about 40l. Sterling. Another building, which had been erected for the accommodation of the scholars in 1578, continued, notwithstanding the great increase of their number, to be used for that purpose till 1777. The foundation of the present new building was laid on the 24th of June that year by Sir William Forbes, Grand Master of the Free Masons. The total length of this building is 150 feet from south to north; the breadth in the middle 36, at each end 38 feet. The great hall where the boys meet for prayers, is 68 feet by 30. At each end of the hall is a room of 32 feet by 20, intended for libraries. The building is two stories high, the one 18, the other 17, feet in height. The expense of the whole when finished is reckoned at 4000l.

There is a rector and four masters, who teach from 4 to 500 scholars annually. The salaries are trifling, and the fees depend upon the reputation they have obtained for teaching; and as this has been for some years very considerable, the rector's place is supposed to be worth not less than 400l. per annum, a master's about half that sum. There is a janitor, whose place is supposed to be worth about 70l. a-year. His duties are to take care of the boys on the play-ground, and there is a woman who lives on the spot as under-janitor, whose place may be worth about 25l. annually. There is a library, but not large, as each of the boys pays only one shilling annually to its support.

There are four established English schools in Edinburgh; the masters of which receive a small salary upon express condition that they shall not take above five shillings per quarter from any of their scholars. There are likewise many other private schools in Edinburgh for all languages; and, in general, every kind of education is to be had here in great perfection and at a very cheap rate.

14. The Mint is kept up by the articles of union, with all the officers belonging to it, though no money is ever struck here. In stands in the Cowgate, a little to the west of the English church; but in a ruinous state, though still inhabited by the different officers, who have free houses; and the bell-man enjoys his salary by regularly ringing the bell. This place, as well as the abbey of Holyrood-house, is an asylum for debtors.

15. The English Chapel stands near the Cowgate port, and was founded on the 2d of April 1771. The foundation-stone was laid by general Oughton, with the following inscription: Edinii facer. Ecclisiæ episc. Anglica, priorum postulatipdem J. Adolphus Oughton,... in architonicæ Scotiae regni curiæ maximus, militium prefident. regnante Georgio III. tertio Apr. die, A. D. MDCCCLXXI. It is a plain handsome building, neatly fitted up in the Inside, and somewhat resembling the church of St. Martin's in the Fields, London. It is 90 feet long, 75 broad, and ornamented with an elegant spire of considerable height. It is also furnished with an excellent bell, formerly belonging to the chapel royal at Holyrood-house, which is permitted to be rung for abdomen the congregation: an indulgence not granted to the Presbyterians in England. The expense of the building was defrayed by voluntary subscription;
...here, of whom the
manner, viz. from south to north, and the altar-piece
stands on the east side. Three clergy men officiate
here, of whom the first has 150l. the other two
100l. each. The altar-piece is finely decorated, and
there is a good organ.

There is another Episcopal chapel, but small, in
Blackfryars wynd, which was founded by Baron
Smith in the year 1722. There are also some meetings
of the Episcopal Church of Scotland, who adhere to
their old forms, having till their bishops and inferior
clergy. For some time these were subjected to penal
laws, as they refused to take the oath to government,
or mention the present royal family in their public
prayers: but of late they have conformed, and had
their prayers approved of by his Majesty; so that now
denomination of Christians in Britain pray for
the royal family on the throne.

16. Heriot's Hospital owes its foundation to George
Heriot, goldsmith to James VI. who acquired by his
Maiden Hospital, and to the society for propagating
maintenance, relief, and fatherless boys, freemen's sons of the town of
the royal family
every denomination of
business a large fortune. At his death, he left the
Hercy's hospital; and those who choose an academical education,
has 150l. the other two number was raised to
100l. a-year provided
the throne. of the Bank of Scotland; after that he became receiver
on ale, treasurer to the merchant's
of Edinburgh in 1676, then accountant
of the city's impost on ale, treasurer to the merchant's
of the city's impost on ale, treasurer to the merchant's
Maiden Hospital, and to the society for propagating
Christian knowledge. Dying a bachelor in 1723, he
left 12,000l. for the maintenance and education of the
children and grand-children of decayed members of
the merchant company of Edinburgh. This scheme,
however, was not put in execution till the year 1738,
when the sum originally left had accumulated to
20,000l. The present building was then erected,
in which about 60 boys are maintained and educated.
It is much less magnificent than Heriot's hospital, but
the building is far from being deplorable. It stands
to the southward of the city at a small distance from
Heriot's hospital, and was erected at the expense of
3000l. : its present revenue is about 1700l. It is un-
der the management of the master, assistants, and
treasurer of the Merchant Company, four bailies, the
old dean of guild, and the two ministers of the old
church. The boys are genteelly clothed and liberally
educated. Such a choose a university education are
allowed 10l. per annum for five years: those who go
to trades have 20l. allowed them for their apprentices
fee; and at the age of 23 years, if they have behaved
properly, and not contracted marriage without consent
of the governors, they receive a bounty of 50l. The
boys are under the immediate superintendence of the
treasurer, school-master, and house-keeper.

18. The Merchants Maiden Hospital was established
by voluntary contribution about the end of the lastcen-
tury, for the maintenance of young girls, daughters of
the merchants burgesses of Edinburgh. The govern-
ors were erected into a body corporate, by act of parl-
ament, in 1707. The annual revenue amounts to
150l. Seventy girls are maintained in it; who, up-
on leaving the house, receive 3l. 6s. 8d. excepting

(a) It is to be observed, that money then bore 10l. per cent. interest.—The above sums are taken from Mr
Arnott's History of Edinburgh, who subjoins the following note. "Where Maitland had collected his most
erroneous account of George Heriot's effects, we do not know. He makes the sum received, out of Heriot's
effects, by the governors of the hospital, to be 43,608l. 11s. 3d. being almost the double of what they really
got. This blunder has been the cause of many unjust murmurings against the magistrates of Edinburgh, and
even the means of spiriting up law-suits against them."
E D I

Edinburgh, a few who are allowed 8 l. 6s. 8d. out of the funds of the hospital. The profits arising from work done in the house are also divided among the girls, according to their industry.

19. The Trades Maiden Hospital was founded in the year 1704 by the incorporations of Edinburgh, for the maintenance of the daughters of decayed members, on a plan similar to that of the merchants hospital. To this, as well as to the former, one Mrs Mary Erskine, a widow gentlewoman, contributed liberally, that she was by the governors styled joint foundress of the hospital. Fifty girls are maintained in the house, who pay of entry-money 1 l. 3s. 4d.; and, when they leave it, receive a bounty of 5 l. 11s. 1/2d. The revenues are estimated at 600l. a-year.

20. The Orphan Hospital was planned in 1732 by Andrew Gairdner merchant, and other inhabitants. It was promoted by the society for propagating Christian knowledge, by other societies, by voluntary subscriptions, and a collection at the church-doors. In 1733, the managers hired a house, took in 30 orphans, maintained them, gave them instructions in reading and writing, and taught them the weaving business. In 1735, they were erected into a body corporate by the town of Edinburgh; and, in 1742, they obtained a charter of erection from his late majesty, appointing most of the great officers of state in Scotland, and the heads of the different societies in Edinburgh, members of this corporation; with powers to them to hold real property to the amount of 1000l. a-year. The revenue is inconsiderable; but the institution is supported by the contributions of charitable persons. Into this hospital orphans are received from any part of the kingdom. None are admitted under seven, nor continued in it after 14 years of age. At present about 140 orphans are maintained in it.

The orphan hospital is situated to the east of the north bridge; and is a handsome building, consisting of a body and two wings, with a neat spire, furnished with a clock and two bells. The late worthy Sir Howard admits, that this institution is one of the most useful charities in Europe, and is a pattern for all institutions of the kind. The funds have been considerably increased, and the building greatly improved, through the attention and exertions of Mr Thomas Tod the present treasurer.

21. The Trinity Hospital. This was originally founded and mainly endowed by King James II.'s queen. At the Reformation, it was stripped of its revenues; but the regent afterwards bequeathed them to the provost of Edinburgh, who gave them to the citizens for the use of the poor. In 1585, the town-council purchased from Robert Porter, at that time provost of Trinity college, his interest in these subjects; and the transept was afterwards ratified by James VI. The hospital was then repaired, and appointed for the reception of poor old widows, their wives, and unmarried children, not under 50 years of age. In the year 1700, this hospital maintained 54 persons; but, since that time, the number has decreased. — The revenue consists in a real estate of lands and houses, the gross rent of which are 762l. a-year; and 5500l. lent out in bonds at 4 per cent.

This hospital is situated at the foot of Leith-wynd, and maintains about 50 of both sexes, who are comfortably lodged, each having a room for themselves. They are supplied with roast or boiled meat every day for dinner, have money allowed them for clothes, and likewise a small sum for pocket-money. There is a small library for their amusement, and they have a chaplain to say prayers. There are some out-pensioners who have 6l. a-year, but these are discouraged by the governors. The funds are under the management of the town-council.

22. The Charity Workhouse was erected in 1743 by voluntary contribution. It is a large plain building, on the south side of the city. Here the poor are employed, and are allowed two pence out of every shilling they earn. The expense of this institution is supposed not to be less than 4000l. annually; as about 700 persons of both sexes, including children, are maintained here, each of whom cannot be reckoned to cost less than 41 s. per annum; and there are besides 300 out-pensioners. The only permanent fund for defraying this expense is a tax of two per cent. on the valued rents of the city, which may bring in about 600l. annually; and there are other funds which yield about 400l. The rent is derived from collections at the church doors and voluntary contributions; but as these always fall short of what is requisite, recourse must frequently be had to extraordinary collections. The sum arising from the rents of the city, however, is constantly increasing; but the members of the College of Justice are exempted from the tax.

There are two other charity workhouses in the suburbs, much on the same plan with that now described; one in the Canongate, and the other in St Cuthbert's or Wel- kirk parish.

To this account of the charitable establishments in Edinburgh, we shall add that of some others; which, though not calculated to decorate the city by any public building, are perhaps no less deserving of praise than any we have mentioned. The first is that of Captain William Horn, who left 3500l. in trust to the magistrates, the annual profits to be divided on Christmas day to poor out-door labourers, who must at that season of the year be destitute of employment; five pounds to be given to those who have large families, and one half to those who have smaller ones.

Another charity is that of Robert Johnston, L.L.D., of London, who in 1660 left 3000l. to the poor of this city; 1000l. to be employed in letting them to work, another 1000l. to clothe the boys in Heriot's Hospital, and the third 1000l. to buriers at the university.

About the beginning of this century John Strachan left his estate of Craigmuckie, now upwards of 300l. a-year, in trust to the provost of Edinburgh, to be by them disposed of in small annual sums to poor old people not under 65 years of age, and to orphans not above 12.

There is besides a society for the support of the indigent poor, another for the indigent sick, and there are also many charity-schools.

Having thus given an account of the most remarkable edifices belonging to Old Edinburgh, we shall now proceed to those of the New Town. This is terminated on the east side by the Calton-hill, round which there is a pleasant walk, and which affords one of the finest prospects that can be imagined, varying
Edinburgh, varying remarkably aloft every step. On this hill is a burying-ground, which contains a fine monument to the memory of David Hume the historian. — On the top is an Observatory, the scheme for building which was first adopted in the year 1736; but the disturbance occasioned by the Porteous mob prevented any thing from being done towards the execution of it at that time. The Earl of Morton afterwards gave 100 l. for the purpose of building an observatory, and appointed Mr M'Laurin professor of mathematics, together with the principal and some professors of the university, trustees for managing the fund. Mr M'Laurin added to the money abovementioned the profits arising from a course of lectures which he read on experimental philosophy; which, with some other small sums, amounted in all to 300 l.: but Mr M'Laurin dying, the design was dropped. — Afterwards the money was put into the hands of two persons who became bankrupt; but a considerable dividend being obtained out of their effects, the principal and interest, about the year 1776, amounted to 400 l. A plan of the building was made out by Mr Craig architect; and the foundation-stone was laid by Mr Stodart, lord provost of Edinburgh, on the 25th of August 1776. About this time, however, Mr Adam architect happening to come to Edinburgh, conceived the idea of giving the whole the appearance of a fortification, for which its situation on the top of the Calton-hill was very much adapted. Accordingly he marked out for inclining the limits of the observatory with a wall constructed with buttresses and embrasures, and having Gothic towers at the angles. Thus the money designed for the work was totally exhausted, and the observatory still remains unfinished; nor is there any appearance of its being soon completed either by voluntary subscription or any other way.

23. Proceeding to the westward, the first remarkable building is the Theatre, which stands opposite to the Register Office, in the middle of Shakespeare Square. The building is plain on the outside, but elegantly fitted up within, and is generally open three days in the week, and when full will draw about 150 l. a night; so that the manager generally finds himself well rewarded when he can procure good companies.

Entertainments of the dramatic kind came very early into fashion in this country. They were at first only representations of religious subjects, and peculiarly designed to advance the interests of religion; the clergy being the composers, and Sunday the principal time of exhibition. In the 16th century, the number of play-houses was so great, that it was complained of as a nuisance, not only in Edinburgh, but throughout the kingdom. They soon degenerated from their original institution; and the plays, instead of being calculated to inspire devotion, became filled with all manner of buffoonery and indecency. — After the Reformation, the Presbyterians complained of these indecencies; and being actuated by a spirit of violent zeal, anathematized every kind of theatrical representation whatever. King James VI. compelled them to pass from their censures against the stage; but in the time of Charles I. when fanaticism was carried to the utmost length at which perhaps it was possible for it to arrive, it cannot be supposed that stage plays would be tolerated. — It seems, however, that amusements of this kind were again introduced at Edinburgh about the year 1684, when the Duke of York kept his court there. His residence at Edinburgh drew off one half of the London company, and plays were acted in Edinburgh for some little time. The misfortunes attending the Duke of York, however, and the establishment of the Presbyterian religion (the genius of which is unfavourable to amusements of this kind), soon put a stop to the progress of the stage, and no theatrical exhibition was heard of in Edinburgh till after the year 1715. The first adventurer was Signora Vajolante, an Italian, remarkable for feats of strength, tumbling, &c. In this way the first exhibited in a house at the foot of Carrubber's Clofe, which has since been employed by different sectaries for religious purposes. Meeting with good success, she soon invited a company of comedians from London; and these being also well received, Edinburgh continued for some years to be entertained with the performances of a strolling company, who visited it annually. Becoming at last, however, obnoxious to the clergy, they were in 1727 prohibited by the magistrates from acting within their jurisdiction. But this interdict was suspended by the Court of Se infants, and the players continued to perform as usual.

Still, however, theatrical entertainments were but rare. The town was visited by itinerant companies only once in two or three years. They performed in the Taylor's Hall in the Cowgate; which, when the house was full, would have drawn (at the rate of 2 s. 6 d. for pit and boxes, and 1 s. 6 d. for the gallery) 40 l. or 45 l. a night. About this time an act of parliament was passed, prohibiting the exhibition of plays, except in a house licensed by the king. Of this the Presbytery of Edinburgh immediately laid hold; and at their own expence brought an action on the statute against the players. The cause was by the Court of Seffion decided against the players; who thereupon applied to parliament for a bill to enable his majesty to licence a theatre in Edinburgh. Against this bill petitions were presented in 1739 to the house of commons by the representatives of Edinburgh, however, obnoxious to the clergy, they were in 1727 prohibited by the magistrates from acting within their jurisdiction. But this interdict was suspended by the Court of Seffion, and the players continued to perform as usual.

The comedians now fell out among themselves, and a new playhouse was erected in the Cowgate in the year 1746. The consequence of this was, that the old one in Taylor's Hall became entirely deserted, and through bad conduct the managers of the new theatre found themselves greatly involved. At last, a riot ensuing through differences among the performers, the playhouse was totally demolished. — When the extension of the royalty over the spot where the new town is built was obtained, a clause was likewise added to the bill, enabling his majesty to licence a theatre in Edinburgh. This was obtained, and thus the opposition of the clergy for ever silenced. But notwithstanding this,
Edinburgh, this, the high price paid by the managers to the patentee, being no less than 300 guineas annually, prevented them effectually from decorating the house as they would otherwise have done, or even from always retaining good actors in their service; by which means the success of the Edinburgh theatre has not been so great as might have been expected.

Not far from this building, an amphitheatre was opened in 1790, on the road to Leith, for equestrian exhibitions, pantomime entertainments, dancing, and tumbling. The circus is 60 feet diameter; and in the forerun ladies and gentlemen are taught to ride. The house will hold about 1500 people.

24. The Register Office. This work was first suggested by the late Earl of Morton, lord-registrar of Scotland, with a view to prevent the danger which attended the usual method of keeping the public records. In former times, indeed, these suffered from a variety of accidents. Edward I. carried off or destroyed most of them, in order to prevent any marks of the former independence of the nation from remaining to posterity. Afterwards Cromwell spoiled this nation of its records, most of which were sent to the tower of London. At the time of the Restoration, many of them were sent down again by sea; but one of the vessels was shipwrecked, and the records brought by the other have ever since been left in the greatest confusion. The Earl of Morton taking this into consideration, obtained from his majesty a grant of 12,000l. out of the forfeited estates, for the purpose of building a register-office, or house for keeping the records, and disposing them in proper order. The foundation was laid on the 27th of June 1774, by Lord Frederic Campbell, lord-registrar, Mr Montgomery of Stanhope lord advocate, and Mr Miller of Balfinmilling lord justice-clerk; three of the trustees appointed by his majesty for executing the work. The ceremony was performed under the direction of the most beautiful of Mr Adams's designs, has been executed in a substantial manner, in about 16 years, at the expense of near 40,000l, and is one of the principal ornaments of the city. A sergeant's guard is placed here from the castle, for the further protection of the records. It is intended to place a statue of his present Majesty in the front of the building, with the lion and unicorn above the centins boxes. The lord-registrar has the direction of the whole, and the principal clerks of Seffion are his deputies. These have a great number of clerks under them for carrying on the business of the Court of Seffion. The lord-registrar is a minister of state in this country. He formerly collected the votes of the parliament of Scotland, and still collects those of the peers at the election of 16 to represent them in parliament.

25. On the east side of St Andrew's Square stands the General Exchequer Office, built by the late Sir Lawrence Dundas for his own residence, but sold by his son for the above purpose. It is a very handsome building, with a pediment in front ornamented with the king's arms, and supported by four Corinthian pilasters; and, in conjunction with the two corner houses, has a fine effect.

26. St Andrew's Church stands on the north side of George's Street. It is of an oval form; and has a very neat spire of 186 feet in height, with a chime of eight bells, the first and only one of the kind in Scotland. It has also a handsome portico in front.

27. Opposite to St Andrew's church is the Physicmen Hall, designed for the meeting of the faculty, and which has a portico resembling that of the church.

28. Farther to the westward, on the south side, stand the Assembly-rooms, which though a heavy looking building on the outside, are nevertheless extremely elegant and commodious within. The largest is 100 feet long and 40 broad, being exceeded in its dimensions by none in the island, the large one at Bath excepted. Weekly assemblies are held here for dancing and card-playing, under the direction of a master of ceremonies; admission-tickets five shillings each.

It now remains only to speak something of the religious and civil establishments of this metropolis. The highest of the former is the General assembly of the Church of Scotland, who meet here annually in the month of May, in an aisle of the church of St Giles fitted up on purpose for them. The throne is filled by a commissioner from his majesty, but he neither debates nor votes. He calls them together, and dissolves them at the appointed time in the name of the king, but they call and dissolve themselves in the name of the Lord Jesus Christ. This assembly consists of 350 members chosen out of the various presbyteries throughout the kingdom; and the debates are often very interesting and eloquent. This is the supreme ecclesiastical court in Scotland, to which appeals lie from the inferior ones.

The ecclesiastical court next in dignity to the assembly is the Synod of Lothian and Tweeddale, who meet in the same place in April and November, and next to them is the Presbytery of Edinburgh. These meet on the last Wednesday of every month, and are trustees on the fund for ministers' widows. They have
Dr.burgh, the town-council have the
advice of the trustees, out of gratitude for the trouble
took in planning and fully establishing the fund.

The Society for propagating Christian knowledge
in the Highlands and Islands of Scotland, was establishted
a body corporate by Queen Anne in the year 1709, for
the purpose of erecting schools to instruct poor children
in the principles of Christianity, as well as in reading and writing. The society have a hall in War-
rilston's close where their business is transacted. From
time to time they have received large contributions,
which have always been very properly applied; and
for much the same purpose his majesty gives 1000l.
annually to the general assembly of the church of
Scotland, which is employed by a committee of their
number for instructing the poor Highlanders in the
principles of the Christian religion.

The Earl's church at Edinburgh was built about
20 years ago by subscription for the laudable purpose. Great numbers of persons resort to the
metropolis from the Highlands, who understand no other
language but their own, and consequently have no oppor-
tunity of instruction without it; and a most
remarkable proof of the benefit they have received from
it, is, that though the church is capable of holding
1000 people, yet it is not large enough for those who
apply for seats. The minister has 100l. per annum
arising from the rent-rents, and holds communion with
the church of Scotland. The establishment was pro-
moted by William Dickson dyer in Edinburgh.

With regard to the political constitution of Edin-
burgh, the town-council have the direction of all pub-
lic affairs. The ordinary council consists only of 25
persons, but the council ordinary and extraordinary, of
33. The whole is composed of merchants and trades-
men, whose respective powers and interests are fo in-
terwoven, that a balance is preserved between the two
bodies. The members of the town-council are partly
elected by the members of the 14 incorporations, and
they partly choose their own successors. The election
is made in the following manner: First a list or feet of
six persons is made out by each incorporation; from
which number the deacon belonging to that incorpo-
ratiun must be chosen. These lists are then laid be-
fore the ordinary council of 25, who "shorten the
feet," by expunging one half of the names from each;
and from the three remaining ones the deacon is to be
chosen. When this election is over, the new deacons
are presented to the ordinary council, who choose six
of them to be members of their body, and the six dea-
cons of last year then walk off. The council of 25
next proceed to the election of three merchant and
two trades councillors. The members of council, who
now amount to 33 in number, then make out leet, from
which the lord provost, dean of guild, treasurer,
and bailies must be chosen. The candidates for each
of these offices are three in number; and the election
is made by the 30 members of council already men-
tioned, joined to the eight extraordinary council-dea-
cons.

The lord provost of Edinburgh, who is styled right
honorable, is high sheriff, coroner, and admiral, within
the city and liberties, and the town, harbour, and road
of Leith. He has also a jurisdiction in matters of life
and death. He is preffs of the convention of royal
boroughs, colonel of the trained bands, commander of
the city-guard and of Edinburgh jail. In the city he
has the precedence of all the great officers of state and
of the nobility; walking on the right hand of the king
or of his majesty's commissioner; and has the privileg-
e of having a sword and mace carried before him. Under
him are four magistrates called bailies, whose office
is much the same with that of aldermen in London.
There is also a dean of guild, who has the charge of
the public buildings, and without whose warrant no
house nor building can be erected within the city. He
has a council to consult with, a nominal treasurer, who
formerly had the keeping of the town's money, which
is now given to the chamberlain. Thefe seven are
elected annually; who with the seven of the former
year, three merchants and two trades councillors, and
14 deacons or prelates of incorporated trades, making in
all 33, form the council of the city, and have the sole
management and dispoal of the city revenues; by
which means they have the dispoal of places to the
amount of 20,000l. annually. Formerly the provost
was also an officer in the Scots parliament. The ma-
agitarios are sheriffs-depute and justices of the peace;
and the town council are also patrons of all the churches
in Edinburgh, patrons of the university, and electors
of the city's representatives in parliament. They have
besides a very ample jurisdiction both civil and crim-
nal. They are superiors of the Canongate, Portburgh,
and Leith; and appoint over these certain of their own
number, who are called baron bailies: but the person
who presides over Leith has the title of admiral, be-
cause he hath there a jurisdiction over maritime affairs.
The baron bailies appoint one or two of the inhabi-
tants of their respective districts to be their substitutes,
and these are called resident bailies. They hold courts
in absence of the baron-bailies, for petty offences, and
discourting civil causes of little moment.

No city in the world affords greater security to the
inhabitants in their persons and properties than Edin-
burgh. Robberies are here very rare, and a street-mur-
der hardly known in the memory of man; so that a per-
on may walk the streets at any hour of the night in
perfect secuity. This is in a great measure owing to
the town-guard. This institution originated from the
town conformation in which the citizens were thrown after
the battle at Flodden. At that time, the town-council
commanded the inhabitants to assemble in defence of
the city, and every fourth man to be on duty each
night. This introduced a kind of personal duty for
the defence of the town, called watching and warding;
by which the trading part of the inhabitants were ob-
liged in person to watch alternately, in order to pre-
vent or suppress occasional disturbances. This, how-
ever, becoming in time extremely inconvenient, the
town-council, in 1648, appointed a body of 60 men to
be raised; the captain of which was to have a monthly
pay of 11. 2s. 3d. two lieutenants of 21. each, two
ferry raids of 11. 5s. and the private men of 15s. each.
No regular fund was established for defraying this
expense; the consequence of which was, that the old
method of watching and warding was resumed; but the
people on whom this service devolved were now become so relaxed in their discipline, that the
magistrates were threatened with having the king's
troops
Edinburgh troops quartered in the city if they did not appoint a sufficient guard. On this 40 men were raised in 1679, and in 1682 the number was increased to 108. After the revolution, the town-council complained of the guard as a grievance, and requested parliament that it might be removed. Their request was immediately granted, and the old method of watching and warding was renewed. This, however, was now so intolerable, that the very next year they applied to parliament for leave to raise 126 men for the defence of the city, and to tax the citizens for their payment. This being granted, the corps was raised which still continues under the name of the town-guard. At present the establishment consists of three officers and about 90 men, who mount guard by turns. The officers have a lieutenant's pay; the ensigns, corporals, drummers, and common soldiers, the same with those of the army. Their arms are the same with those of the king's forces; but when called upon to quell mobs, they use Lochaber-taxes, as a part of the ancient Scottish armour now in use only among themselves.

The militia or trained band of the city consist of 16 companies of 100 men each. They were in use to turn out every King's birth-day; but only the officers now remain, who are chosen annually. They consist of 16 captains and as many lieutenants; the provost, as has already been mentioned, being the colonel.

The town-guard are paid chibby by a tax on the trading people; these being the only persons formerly subject to watching and warding. This tax, however, amounts only to 1250l. and as the expense of the guard amounts to 1400l. the magistrates are obliged to defray the additional charge by other means.

The number of inhabitants in the city of Edinburgh is somewhat uncertain, and has been very variously calculated. By a survey made in the year 1773, it appears that the number of families in the city, Canongate, and other suburbs, and the town of Leith, amounted to 13,806. The difficulty therefore is to fix the number of persons in a family. Dr Price fixes this number at 4,1; Mr Maitland, at 5; and Mr Arnot, at 6: so that, according to this last gentleman, the whole number of inhabitants is 82,836; to which he thinks 1400 more may be added for those in the garisons, hospitals, &c. There are in Edinburgh 14 inns, containing several hundred rooms, viz. The royal college of surgeons; the corporations of goldsmiths, skinners, furriers, hammermen, wrights and malons, tailors, bakers, butchers, shoemakers, weavers, waukurers, bonnet-makers, and merchant companies. The revenue of the city, arising partly from duties of different kinds, and partly from landed property, is estimated at about 10,000l. per annum.

The markets of Edinburgh are plentifully supplied with all sorts of provisions. Fresh butcher-meat, as well as fowl and fish, if the weather permit, may be had every day; and no city can be better supplied with garden fruits. The Edinburgh strawberries particularly are remarkably large and fine. A remarkable instance of the plenty of provisions with which Edinburgh is supplied was observed in the year 1770, when several large fleets, all of them in want of necessaries, arrived in the Firth, to the amount of about 500 sail, and having on board at least 30,000 Edinburgh men; yet the increased consumption of provisions, which certainly ensued upon the arrival of so many strangers, made not the least increase in the rate of the markets, infomuch that several virtualing ships went down by the navy-board returned without opening their hatches. The city-mills are let to the corporation of bakers in Edinburgh; and the bread made in the city is remarkable for its goodness.

Edinburgh is supplied with water brought for some miles in pipes, and lodged in two reservoirs, whence it is distributed through the city both to public wells and private families. A revenue accrues to the town from the latter, which must undoubtedly increase in proportion as the city extends in magnitude.

There are but few merchants in Edinburgh, most of them residing at the port of Leith; so that the support of the city depends on the consumption of the necessaries as well as the superfluities of life. There are five different sorts of people on whom the shopkeepers, publicans, and different trades depend: 1. The people of the law, who are a very respectable body in the city. 2. The number of young people of both sexes who come to town for their education, many of the parents of whom come along with them. 3. The country gentlemen, gentlemen of the army and navy, and people who have made their fortunes abroad, &c. all of whom come to attend the public diversions, or to spend their time in such a manner as is most agreeable to them. 4. The vast concourse of travellers from all parts. 5. The most of the money drawn for the rents of country gentlemen is circulated among the bankers or other agents.

At Edinburgh there are excellent manufactures of linen and cambries; there are also manufactures of paper in the neighbourhood, and printing is carried on very extensively. But for some time the capital branch about Edinburgh has been building: which has gone on, and still continues to do so, with such rapidity, that the city has been increased exceedingly in its extent; and it is not uncommon to see a house built in a few months, and even inhabited before the roof is quite finished.

EDITOR, a person of learning, who has the care of an impression of any work, particularly that of an ancient author: N. Ruddiman was a great editor; the Louvain doctors, Scaliger, Petavius, F. Simmond, bishop Walton, Mr Hearne, Mr Ruddiman, &c. are likewise famous editors.

EDOM, or IDUMEA (anc. geogr.), a district of Arabia Petraea; a great part alfo of the south of Judæa was called Idumæa, because occupied by the Idumæans, upon the Jewish captivity, quite to Hierbron. But the proper Edom of Idumæa appears not to have been so extensive, from the march of the Israelites, in which they compassed it on the south easterly, till
they came to the country of the Moabites. Within this compass lies mount Hor, where Aaron died; marching from which the Israelites fought with king Arad the Canaanite, who came down the wilderness against them (Moes.). And this is the epocha of the

1 EDMUND I, and II. See (History of) England.

2 Particulars comprehended under the definition.

3 Various modes of education have prevailed.

4 Plin.

5 Education in a savage state.

and precarious situation, their ignorance of the laws of

nature, their deficiency of moral and religious principles,
and their want of dexterity or skill in any of the
arts of life, all these together must render them unable
to regulate the education of their children with much
attention or sagacity. They may relate to those the
ewild inconsistent tales in which all their notions con-
cerning superior beings and all their knowledge of
the circumstances and transactions of their ancestors are
contained; they may teach them to bend the bow, to
point their arrows, to hollow the trunk of a tree into
a canoe, and to trace the almost imperceptible path of
an enemy or a wild beast over dreary mountains or
through intricate forests: but they cannot impress
their minds with just ideas concerning their social
relations, or concerning their obligations to a Supreme
Being, the frame and upholder of nature: they teach
them not to repress their irregular appetites, nor to re-
strain the fancies of passion when they exceed just bounds
or are improperly directed; nor can they inform their
understandings with very accurate or extensive views
of the phenomena of nature. Besides, they know not
how far implicit obedience to his parent's commands
is to be required of the boy or youth, nor how far he
ought to be left to the guidance of his own reason or
humour. Among savages the influence of parental
authority soon expires, nor is the parent solicitous to
maintain it. As the eagle expels his young from his
lofty nest as soon as they become able to support them-very few the benefits which parents
or the quality is indeed absolutely nece-
sary to fit the

1 EDMUND, Education.
Education, ceased to enjoy the protection of his parents would most probably be the last day of his life: That quality is Fortitude. We may perhaps think, that the hardships to which the young savage is from the period of his birth unavoidably exposed, might be enough to inspire him with fortitude; but, as if these were insufficient, other means are applied to inspire him with what the Stoics have regarded as the first of virtues. He is compelled to submit to many hardships unnecessary, but from a view to this. Children are there called to emulate each other in bearing the severest torments. Charlevoix relates, that he has seen a boy and girl bind their arms together, place a burning coal between them, and try who could longest endure without shrieking the pain to which they thus exposed themselves.

The savage indebted chiefly to nature and circumstances for his education.

Still, however, the young savage owes his education rather to nature and to the circumstances in which he is placed, and the accidents which befal him, than to the kindness or prudence of his parents. Nature has endowed him with certain powers of understanding, sentiments, affections, and bodily organs; he has been placed in certain circumstances, and is exposed to certain train of events; and by these means chiefly, not by the watchful industry of instructors, does he become such as he appears when he has reached the years of maturity.

But man was not designed by his wife and beneficent Creator to remain long in a savage state; the principles of his nature incline him to social life. Reason, distinguishing the superior advantages to be enjoyed in society, concurs with the social principle in his breast, in prompting him to seek the company and conversation of others of the human race. When men enter into society, they always unite their powers and talents, in a certain degree, for the common advantage of the social body. In consequence of this, laws come in time to be instituted; new arts are invented; progress is made in the knowledge of nature; moral duties are better understood and defined; juster ideas are gradually acquired of all our social relations; friendship, love, filial, parental, and conjugal affection, are heightened and refined. All these advantages do not infallibly result from men's entering into a social state; the improvement of the human mind, and the civilization of society, are only more rapid and progressive. But as it is natural for men to unite in a social state, so it is no less natural for society to be gradually improved and civilized till it attain an high degree of perfection and refinement.

When men have attained to such knowledge and improvement as to be intitled to a more honourable appellation than that of savages, one part of their improvements generally consists in directing the education of their youth. They have now acquired ideas of dependence and subordination; they have arts to teach and knowledge to communicate; they have moral principles to infill; and have formed notions of their relation and obligations to superior powers, which they are deformed that their children should also entertain. Their affection to their offsprings is now also more tender and constant. We observe at present, in that state of society in which we live, that the poor who can scarce earn for themselves and their children the necessaries of life, are generally less susceptible of parental affection, in all its anxious tenderness, than the rich, or those whom Providence hath placed in easy circumstances; and we may make use of this fact in reasoning concerning the different degrees of the same affection felt by the savage and the member of a civilized society. The savage may be considered as the poor man, with difficulty procures the necessaries of life even for himself; the other, as the man in affluent circumstances, who is more at leisure to listen to the voice of tender and generous affection.

In this improved state of society, the education of youth is viewed as an object of higher importance. The child is dearer to his parent; and the parent is now more capable of cultivating the understanding and rectifying the dispositions of his child. His knowledge of nature, and his dexterity in the arts of life, give him more authority over a child than what the savage could possess. Obedience is now enforced, and a system of education is adopted; by means of which the parent attempts to form his child for acting a part in social life. Perhaps the legislature interferes; the education of the youth is regarded as highly worthy of public concern; it is considered that the foolish foundlings or the unnatural caprices of parents may, in the rising generation, blst the hopes of the state.

In reviewing ancient history, we find that this establishment for education among the ancients. Public establishments were formed among those nations, and a series of institutions enacted, for carrying on and regulating the education of their youth: Not such as the European universities, in which literary knowledge is the sole object of pursuits, the student is maintained solely at his parent's expense, and attends only if his parents think proper to send him; but of a very different nature, and on a much more enlarged plan.

The Persians, according to the elegant and accurate account delivered by Xenophon in the beginning of his Cyropedia, divided the whole body of their citizens into four orders; the boys, the youth, the full-grown men, and those who were advanced beyond that period of life during which military service was required. For each of these orders, particular halls were appropriated. Each of them was subjected to the inspection of twelve rulers. The adults and the superannuated were required to employ themselves in the performance of particular duties, suitable to their age, their abilities, and their experience; while the boys and the youth were engaged in such a course of education as seemed likely to render them worthy and useful citizens.

The boys were not employed, in their places of instruction, in acquiring literary accomplishments; for such the Persians were strangers. They went thither to learn justice, temperance, modesty; to shoot the bow, and to launch the javelin. The virtues and the bodily exercises were what the Persians laboured to teach their children. These were the direct, and not subordinate, purpoee of their system of education. The masters used to spend the greatest part of the day in
dispensing justice to their scholars; who carried before them actions for thefts, robberies, frauds, and other such grounds of complaint against one another. — Such were the means by which the Persians endeavoured to inflame the public spirit, even in early youth, a regard for the laws of national equity, and for the infinities of their country. Till the age of 16 or 17, the boys were baulked of acquiring those parts of education. At that period they ceased to be considered as boys, and were raised to the order of the youths. After they entered this order, the same views were still attended to in the carrying on of their education. They were still enured to bodily labour. They were to attend the magistrates, and to be always ready to execute their commands. They were led out frequently to the chase; and on such expeditions they were always headed by the king, as in time of war. Here they were taught to expose themselves fearlessly to danger; to suffer, without repining or complaint, hunger, thirst, and fatigue; and to content themselves with the coarsest, simplest fare, for relieving the necessities of nature. In short, whether at home or out on some hunting expedition, they were constantly employed in acquiring new skill and dexterity in military exercises, new vigour of mind and body, and confirmed habits of temperance, fortitude, abstinence, patience, patriotism, and noble integrity. After spending ten years in this manner, their course of education was completed; they were admitted into the class of the adults, and were esteemed qualified for public offices. It must not escape our notice, that the citizens were not compelled to fend their children to pass through this course of education in the public halls; but none except such as passed through this course of education were capable of civil power, or admitted to participate in public offices or public honours.

Such are the outlines of that system of education which Xenophon represents as publicly established among the Persians. We were able to preserve in a translation all the manly and graceful simplicity of that enchanting author, we would have offered to the public the passages in which he has described it; but conscious of being inadequate to that task, we have preserved only to extract the information which it contains.

Perhaps, however, this system of education did not subsist precisely as the eloquent disciple of Socrates describes it among that rude and simple people. On other occasions he has commemorated such influences of their barbarity, as would tempt us to think them incapable of so much order and so much wisdom. Perhaps, as the discoverers of the new world have sometimes conferred on the inhabitants of that hemisphere, in the accounts of them with which they entertained their successors, in Europe, the degrees of moral and political wisdom, of skill and dexterity in the arts, of industry and valour, those uncivilized children of nature were afterwards found not to polish; so the Athenian philosopher has also ascribed to the Persians prudence and attention in regulating the education of their youth beyond what people in so rude a state can possibly execute.

But if we examine into the principles on which this system of education proceeds, without considering ourselves whether it once actually prevailed among the Persians, or is the production of the fine imagination of Xenophon, we will find it peculiarly suitable for a nation just emerging from the rudeness and ignorance of barbarity to a knowledge of social and civil relations, and of the duties connected with such relations. They have sacrificed their independence to obtain the comfort and security of a social state. They now glory in the appellation of citizens, and are defirous to discharge the duties incumbent on a citizen. They must inform their children in the nature of their social relations, and impress them with habits of discharging their social duties; otherwise the society will soon be dissolved, and their poverty will fall back into the same dark miserable state from which they have emerged.

But perhaps the circumstances, or abilities, or dispositions of individuals, render them unequal to this weighty task. It becomes therefore naturally an object of public care. The whole social body find it necessary to deliberate on the most proper means for discharging it aright. A plan of education is then formed; the great object of which is, to fit the youth for discharging the duties of citizens. Arts and sciences are hitherto wholly unknown: and all that can be communicated to the youth is only a skill in such exercises as are necessary for their procuring subsistence, or defending themselves against human enemies, or beasts of prey; and habits of performing those duties, the neglect of which must be fatal to the society or the individual.

Such is the system of education which we have surveyed as established among the Persians, and perhaps we may now be less suspicious than before of Xenophon's veracity. It appears natural for a people who have reached that degree of civilization in which they are described, and have not yet advanced farther, to institute such an establishment. Some such establishment also appears necessary to prevent the society from falling back into their former barbarity. It will prevent their virtue and valour from decaying, though it may perhaps at the same time prevent them from making any very rapid progress in civilization and refinement. Yet the industry, the valour, the integrity, and the patriotism which it inspires, must necessarily produce some favourable change in their circumstances; and that change in their circumstances will be followed by a change in their system of education.

The Cretans, too, the wisdom of whose laws is so much celebrated in the records of antiquity, had a public establishment for the education of their youth.

Minos, whom they revered as their great legislator, was also the founder of that establishment. Its tendency was similar to that of the course of education preserved among the Persians,—to form the soldier and the citizen. We cannot present our readers with a very particular or accurate account of it; but such as we have been able to procure from the best authorities we think it our duty to lay before them.

The Cretans were divided into three classes: the boys, the youth, and the adults. Between seven and seventeen years of age, the boy was employed in learning to shoot the bow, and in acquiring the knowledge of his duties as a man and a citizen, by listening to the conversation of the old men in the public halls and observing their conduct. At the age of seven, he was conducted to the public halls to enter on this course
course of education. He was taught to expose himself boldly to danger and fatigue; to aspire after skill and dexterity in the use of arms and in the gymnastic exercises; to repeat the laws and hymns in honour of the gods. At the age of seventeen he was enrolled among the youth. Here his education was still continued on the same plan. He was to exercise himself among his equals in boxing, wrestling, and the military exercises; and while thus engaged, his spirits were roused and animated by strains of martial music played on such instruments as were then in use among the inhabitants of Crete. One part of the education of the Cretan youth, in which they were particularly defirous to excel, was the Pyrrhic dance; which was the invention of a Cretan, and consisted of various military evolutions performed to the sound of instruments.

Such were the principles and arts in which the Cretan legislature directed the youth to be instructed. This course of education could not be directed or superintended by the parent. It was public, and carried on with a view to fit the boy for discharging the duties of a citizen when he should attain to manhood.

It is easy to see, that such a system of education must have been instituted in the infancy of society, before many arts had been invented, or the distinctions of rank had arisen; at a time when men subsisted in a considerable degree by hunting, and when the intercourse of nations was on such a footing, that war, instead of being occasional, was the great buisness of life. Such a system of life would then naturally take place even though no sage legislator had arisen to regulate and enforce it.

Lycurgus, the celebrated lawgiver of Lacedemon, thought it necessary to direct the education of youth in a particular manner, in order to prepare them for paying a strict obedience to his laws. He regarded children as belonging more properly to the state than to their parents, and wished that patriotism should be still more carefully cherished in their breasts than filial affection. The spirit of his system of education was pretty similar to that of those which we have just viewed as subsisting among the Persians and the Cretans.

As soon as a boy was born, he was submitted to the inspection of the elders of that tribe to which his parents belonged. If he was well shaped, strong, and vigorous, they directed him to be brought up, and alligned a certain portion of land for his maintenance. If he was deformed, weak, and sickly, they condemned him to be exposed, as not being likely ever to become an useful citizen. If the boy appeared worthy of being brought up, he was entrusted to the care of his parents till he attained the age of seven years; but his parents were strictly charged not to spoil either his mind or his bodily constitution by foolish tenderness. Probably, too, the state of their manners was at that time such as not to render the injunction peculiarly necessary.

At the age of seven, however, he was introduced to a public class, consisting of all the boys of the same age. Their education was committed to masters appointed by the state; and what was chiefly inculcated on them in the course of it, was submissive obedience and respect to their superiors; quickness and brevity in their conversation, and replies to such questions as Education were put to them; dexterity and address in performing what was commanded them, and firmness and patience in bearing every pain or hardship to which they might be exposed. One of the means used to form them to habits of activity and address, was to permit, nay, to direct them to commit little acts of theft; which, if they performed them fo dexterously as to avoid detection, they might afterwards boast of as noble exploits: but if detected in such enterprises, the awkward artificer boy was exposed both to punishment and disgrace. To avoid the punishment and disgrace incurred by being detected in an act of theft, the Spartan boy would often suffer with unshrinlking fortitude the severest tortures. It is related of one of them, that rather than be discovered with a young fox under his cloak, which he had stolen, he suffered the little animal to tear open his bowels. Not content with beholding the children suffer by submitting voluntarily to such hardships, the Spartans also endeavoured to form them to be unyielding, by whipping them on their religious festivals, sometimes with such severity that they expired under the lash. The Lacedemonian youth were also taught such bodily exercises, and the use of such warlike weapons, as were necessary to render them expert and skilful soldiers.

They, too, as well as the Cretans and Persians, among whom we have seen that somewhat similar modes of education prevailed, were to be citizens and soldiers; not husbandmen, mechanics, artists, merchants, &c. Therefore the mode of education established among them was simple and uniform. Its aim was, to make them acquainted with the nature of their fiscal duties, and to form them to such vigour of body and such firmness of mind as might render them fit for the station in which they were to be placed, and adequate to the part which they were to act. This establishment for education was perfectly consistent with the other parts of that legislature which was instituted by Lycurgus. Youth educated among the Lacedemonians could hardly fail to become worthy members of that singular republic. Let us not, however, regard the Spartans as singularly inhuman in their treatment of youth. Let us reascend, in imagination, to that period in the progress of society from rudeness to refinement, to which they had attained when Lycurgus arose among them. What were then their circumstances, their arts and manners, their moral principles, and military discipline? Not very different from those which the laws of Lycurgus rendered so long stationary among them. He, no doubt, rectified some abuses, and introduced greater order and equality. But man is not to be so easily metamorphosed into a new form. As you cannot, at once, raise an acorn to a venerable oak; so neither will you be able to change the savage, at once, into the citizen. All the art or wisdom of Lycurgus, even though ascribed by all the influence of the prophetic Apollo, could never have established his laws among his countrymen, had not their character and circumstances previously disposed them to receive them. But, grant this, and you must, of consequence, allow, that what to us may appear cruel and inhuman, must have affected their feelings in a different manner. The change introduced in the treatment of youth by the establish
ment of this system of education was probably recommended by its being more humane than what before prevailed. Corrupted as are our manners, and effeminate our modes of education; yet we would not perhaps act wisely in laying them aside, to adopt in their stead those of ancient Sparta. But the Spartan education was peculiarly well fitted to form citizens for the republic of Lycurgus; it was happily adapted to that state of society in which it was introduced. And, if we should enquire by what means Lycurgus was enabled to fix the arts, the manners, and in short the civilization of his country, for so long a period in a stationary state; we would perhaps find reason to ascribe that effect, to the public establishment which he instituted for the education of youth; to his confining the Spartan citizens to the profession of arms, and assigning all servile offices to the Helots; and to his prohibiting the use of gold and silver. Among these however his establishment for education occupies the chief place. Never was any state adorned with more patriotic citizens than those of Sparta. With them every private affection seemed to be swallowed up by the amor patriae; the love of their country was at least their ruling passion. Pedarates being rejected when he offered himself a candidate for a seat among the council of three hundred, returned home, rejoicing that there were in Sparta no fewer than three hundred whom his countrymen found reason to regard as better citizens than himself. This was not a seeming joy, assumed to conceal the pain which he suffered from the disappointment; it was heartfelt and sincere. Such were the effects of their system of education.

When we turn our eyes from the Persians, the Cre- tens, and the Spartans, to the other nations of antiquity; we note how behold so regular a system of public education. Among the Athenians and the Romans, the laws did not defend to regulate in so particular a manner the management of the youth. These nations gradually emerged from a state of rudest barbarity, to that polished, enlightened, and civilized state which rendered them the glory and the wonder of the ancient world. But though the education of youth was managed in a different manner among these and most other nations in the ancient world, than by public establishments, which detached children from the care of their parents; yet still it was every where regarded as an object of the highest importance. As the manners of mankind gradually improved to a state of refinement; as the invention of arts, and the discovery of science gradually introduced opulence and luxury; connubial, parental, and filial affection gradually acquired greater strength and tenderness. Of consequence, children experienced more of their parent's care; and that care was directed to form them for acting a becoming part in life. According to the circumstances of each nation, the arts which they cultivated, and the form of government under which they lived; the knowledge which they sought to communicate to their children, and the habits which they endeavoured to impress upon them, were different from those of other nations. And again, the different circumstances, tempers, abilities, and dispositions of parents, even the children of each family were brought up in a manner different from that in which those of other families were managed. The Athenians, the Romans, the Carthaginians, conducted each of them the education of their youth in a different manner, because they had each different objects in view. But having considered the most singular establishments for education which prevailed in the ancient world, it seems unnecessary for us to descend to a particular account of the manner which every nation, or fanciful individual, thought proper to pursue in bringing up their youth. It will probably be more useful and entertaining to our readers, if we next present them with a view of some of the most judicious or fanciful plans of education which have been proposed by the writers on that subject.

One of the most respectable writers on education among the ancients, is the celebrated Quintilian. He taught rhetoric in Rome during the reign of Domitian and under several of the other emperors. When he retired from the exercise of his employment as a teacher of rhetoric, he spent his leisure in the composition of a treatise, not merely on rhetoric, but on the most proper means for educating a boy so as to render him both an eloquent orator and a good man.

In that valuable treatise, he enters into a minute detail of all that appears to him most likely to conduci to those important ends.

As soon as the boy enters the world, he would have the greatest care to be used in selecting those who are to be placed about him. Let his nurse have no impediment of speech. It will be happy for him, if his parents be persons of sense and learning. Let his tutor, at least, posses these qualifications. As soon as he attains the distinct use of his organs of speech, let him be initiated in the first elements of literature. For as he is capable of distinguishing and remembering at a very early age; so his faculties cannot possibly be employed in a more advantageous manner. And even at this early period of life, let maxims of prudence and the first principles of morals be inculcated upon his mind by the books which are put into his hands, and even by the lines which he copies in learning the art of writing. The Greek language was to the Romans in the days of Quintilian, what the Latin and Greek and French are to us at present, an acquisition held indispensably necessary to those who aspired to a liberal education; and Quintilian judges it proper that the boy should begin his application to letters with the Greek language in preference to his mother tongue.

This judicious writer next examines a question which has been often agitated, Whether a domestic or public education is liable to the fewest inconveniences, and likely to be attended with the greatest advantages? And he is of opinion, that in a domestic education the boy is in danger of being corrupted by injudicious fondness and evil example; is not rooted by the spur of emulation; and is deprived of proper opportunities for acquiring a just idea of his own powers, or that
...activity and dexterity which he will afterwards find
...necessary when he comes to act a part in life: While
...in a public education, which was preferred by some
...of the most renowned nations of antiquity, the morals
...are not greatly exposed to corruption, emulation is
...roused, friendships are formed, all the powers of the
...mind are called forth to act with new vigour, and the
...youth is prepared for performing his part on the great
...theatre of the world. Quinellian, therefore, wishes
...that parents would place their children in public fe-
...minaries of education.

When a boy is committed to a master's care, the
...master's attention must be first directed to discover his
...dispositions and the extent of his capacity. Of his
...capacity he will form a favourable judgment, not from
...his sprightliness, nor even from his quickness of ap-
...prehension; but from his modesty, docility, and vir-
...tuous dispositions. If the boy profess these last qual-
...fications, the master will rejoice in him, as likely to
...give him satisfaction and do him honour. According
...to his temper and dispositions, let the boy be treated
...with mildness or severity; but never let severity ex-
...tend to blows. Let the boy be allured and led, by the
...most artful and insinuating treatment, to do his duty;
...there will then be no occasion to punish him for ne-
...glecting it.

As Quinellian's professed object was, not merely to
give general directions for forming the heart and cul-
tivating the understanding, but to form a particular
character in life, the scholar and the orator; he finds
it necessary to enter into minute details concerning the
manner in which the boy is to be instructed in speak-
ing, writing, grammar, and composition; of which it
does not appear necessary for us to take particular
notice in this place. Music and geometry, he thinks,
ought to make a part of the young orator's studies;
as being useful to render him accurate in reasoning,
and capable of relishing the beauties of the poets. He
is also of opinion, that the boy should not be confined
to one branch of study, without being allowed to at-
tempt others till he have made himself master of that.
Let several parts of literature engage his attention by
turns; let him dedicate a considerable portion of his
time to them. He may thus acquire habits of indu-
frious application which will remain with him the rest
of his life.

With the tender attention of a good man, this sen-
sible and elegant writer still accompanies his pupil
through the course of his studies; anxiously inquisi-
ting that he be placed under a master distinguished for purity of
morals, and for no mean abilities in his profession; di-
rects his memory to be stored with the noblest passages
of the poets, orators, and historians; and carefully dis-
sects and refutes those opinions which represent gen-
us as above industry. The remaining part of his
work being employed on the principles of rhetoric,
without containing anything on the subject of educa-
tion in general it is not necessary that we should here
present an analysis of it to our readers. But since
Quinellian was so distinguished, not only as a rhetor-
ician, but as an instructor of youth, and displays so
much good sense and so solid a judgment, formed on
long experience, in whatever he advances on the sub-
ject of education; we could not without extreme ne-
gligence, omit taking notice of him under this ar-
ticle, and affording our readers an opportunity of Ed-
учия, being instructed by his sentiments on this
head.

The name of John Milton is so universally revered,
that his sentiments on any subject must be interesting.
His life was dedicated to study: During a part of it,
he was employed in the task of instructing youth,
and among his other works we find a treatise on edu-
cation. He had himself been educated according to
that plan which has long been established in the En-
glish universities; but with that mode of education he
was not satisfied. The object of his directions is
chiefly to form the scholar. He considered himself as
qualified to exhibit a model of "a better education,
in extent and comprehension far more large, and yet
of time far shorter, and of attainment far more cer-
tain, than any that had yet been in practice." The
following is the substance of his treatise.

As the end of learning is to cultivate our under-
standing, and to rectify our dispositions; therefore the
design of our applying to the study of languages can-
not be merely that we may commit to memory the
words of which they consist, or that we may acquire
a knowledge of their analogy and structure; but that
we may enrich our minds with the treasures of wisdom
which they contain. But in the present modes of edu-
cation this design does not appear to be kept in view.
The learner of Latin is burdened with rules, and
themes, and verbes, and orations; but no care is taken
to make him master of the valuable knowledge which
the classics contain. And when he advances a little
farther, he is driven into the thorny paths of logic
and metaphysics. So, when his studies are completed,
and he is considered as having received a liberal edu-
cation, he is almost as deficient of real knowledge as
when he first entered a school.

But to render learning truly beneficial, instead of the
school and university education which youth at pre-
sent receive; let the place of both school and uni-
versity be supplied by an academy, in which they may
acquire all that is taught at either, except law and phy-
sic. Let the academy afford accommodation for 150
persons; 20 of whom may be servants and attendants.
As many academies as are necessary may be afterwards
erected on the model of this one. Let the youth
who are introduced into this academy begin their stu-
dies with learning the principles of grammar from
some good elementary book. In their pronunciation
of Latin, let them be taught to follow the pronun-
ciation of the Italians; as that of the English is in-
different, and unsuitable to the genius of the language.
Next, read to them some entertaining book on educa-
tion; such as, the three first books of Quinellian in
Latin; and Cebes, Plutarch, or some other of the So-
cratic discourses, in Greek; and be careful to seize
every opportunity of inspiring them, by reasonable lec-
tures and explanations, with love for learning, admir-
aion of great and virtuous characters, and a disposition
to cheerful obedience. At the same time, but at a
different hour of the day, let them be instructed in the
rules of arithmetic and the elements of geometry. Be-
tween fopper and bed-time instruct them in the prin-
ciples of religion and the sacred history. From the
writers on education let your pupils pass to the authors
on agriculture, to Cato, Varro, and Columella.
For half these authors be read, they cannot but be
very well qualified to read most of the prose authors
in the Latin language; and they may now, with great
propriety, learn the use of the globes, and make them-

themselves acquainted with the ancient and modern maps.

Let them, about the same time, begin the study of
the Greek tongue, and proceed in it as in the Latin:
they will not fail to overcome, in a little time, all the
difficulties of grammar; after which they will have ac-
cess to all the treasures of natural knowledge to be
found in Aristotle and Theophrastus. In the same
manner they may make themselves acquainted with
Vitruvius, Seneca, Mela, Celsus, Pliny, and SOLVINI.
And having thus puffed through the principles of arith-
metic, geometry, astronomy, and geography, with a
general compass of physics; let them next turn their
attention to mathematics, in which they may begin
with the practical branch of trigonometry, which will
serve as an introduction to fortification, architecture,
and navigation. To teach them the knowledge of
nature, and instruct them in the arts of life, let them
have the affinities and instructions, not merely of ma-
sters who are acquainted only with books, but of men
whose skill has been obtained by actual practice, even
of artists and mechanics. Next, let the poets obtain
their attention; and they will now read them with ease
let them be more particularly

At the same time, let them have a familiar acquaintance
with the Roman tables, the histories of their mother country. Now
from the writings of some of thefe, will have the

next turn their

effects.

Mr Locke, to whose abilities and noble desire to be
useful to the world, his country is so much indebted,
has written, among other things, on the education
of youth. He was capable of thinking for himself; but
more desirous of rendering himself useful, than of be-
ing admired for singularity. He is, therefore, an au-
thor to whom we ought to listen, at least, with re-
spectful attention. If Quintillian and Milton had
been employed as teachers of youth, Mr Locke had
been conversant with the world, had inquired into the
principles of human nature, and had no doubt en-
deavoured to examine without prejudice the effects
de such modes of education as which he disapproves.

When we consider, that, to render himself useful to
the rising generation, he could descend from the
heights of science to translate the fables of Aesop,
and to perform other humble tasks in literature, which
a philologist of less benevolence and virtue would
have dinned; we cannot but look with veneration
at the friend to whom we ought to listen, at least, with re-
spectful attention. In his Treatise on Education, the two great objects which Mr
Locke keeps in view are, first, To prevent ill-directed
strength the body, and repeat in a proper manner, passages
from the writings of some of thefe, will have the
happiest effects in elevating their genius. Let this
stately edifice be crowned with logic and rhetoric. Far
different would be the effects of such a course of edu-
cation, from those produced by any which is at pre-
sent pursued. We should then see able writers, more
elegant speakers, and wiser statesmen. Similar to
this, probably, was the course taught in the famous
 schools of Pythagoras, Plato, Iocrates, and Aristotle.
This would unite the advantages of an Athenian and a
Spartan education: for our pupils should be taught the
exercises of wrestling and fencing, and the whole
military discipline.

Such are the ideas of the admirable Milton on the
subject of education. An enthusiastic admirer of the
sciences, arts, and institutions of Greece and Rome;
from his religious and political principles, no friend to
the universities; it was natural for a man of his learn-
ing and ingenuity, in an age of innovation, and influ-
enced by such prejudices, to form such a project as
which we have surveyed. He seems not to have re-
lected, that it is necessary for children to be long oc-
cupied in obtaining a familiar acquaintance with
Education.

words, before they can gain from books any know-
ledge of things; overlooking this circumstance, and
perceiving plainly that the mode of education which
then prevailed confined the attention of youth almost
wholly to words, he could not but regard the scheme
which he proposed as likely to produce very happy

effects. His observation, that the appearances of ex-
ternal nature are among the first objects which attract
the attention of youth, which he communicates by di-
recting his pupils to peruse the writers on agriculture
and natural history as near the beginning of their stu-
dies as possible; if not altogether juf, yet must be
allowed to be nearly so. Perhaps human actions and
passions, and the series of events which happen around
us, are, by the time at which we begin our appli-
cation to learning, the objects which most frequently
and strongly engage our attention: But the appear-
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more desirous of rendering himself useful, than of be-
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been employed as teachers of youth, Mr Locke had
been conversant with the world, had inquired into the
principles of human nature, and had no doubt en-
deavoured to examine without prejudice the effects
de such modes of education as which he disapproves.

When we consider, that, to render himself useful to
the rising generation, he could descend from the
heights of science to translate the fables of Aesop,
and to perform other humble tasks in literature, which
a philologist of less benevolence and virtue would
have dinned; we cannot but look with veneration
at the friend to whom we ought to listen, at least, with re-
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Locke keeps in view are, first, To prevent ill-directed
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from the writings of some of thefe, will have the
happiest effects in elevating their genius. Let this
stately edifice be crowned with logic and rhetoric. Far
different would be the effects of such a course of edu-
cation, from those produced by any which is at pre-
sent pursued. We should then see able writers, more
elegant speakers, and wiser statesmen. Similar to
this, probably, was the course taught in the famous
 schools of Pythagoras, Plato, Iocrates, and Aristotle.
This would unite the advantages of an Athenian and a
Spartan education: for our pupils should be taught the
exercises of wrestling and fencing, and the whole
military discipline.

Such are the ideas of the admirable Milton on the
subject of education. An enthusiastic admirer of the
sciences, arts, and institutions of Greece and Rome;
from his religious and political principles, no friend to
the universities; it was natural for a man of his learn-
ing and ingenuity, in an age of innovation, and influ-
enced by such prejudices, to form such a project as
which we have surveyed. He seems not to have re-
lected, that it is necessary for children to be long oc-
cupied in obtaining a familiar acquaintance with
Education.

words, before they can gain from books any know-
ledge of things; overlooking this circumstance, and
perceiving plainly that the mode of education which
then prevailed confined the attention of youth almost
wholly to words, he could not but regard the scheme
which he proposed as likely to produce very happy

effects. His observation, that the appearances of ex-
ternal nature are among the first objects which attract
the attention of youth, which he communicates by di-
recting his pupils to peruse the writers on agriculture
and natural history as near the beginning of their stu-
dies as possible; if not altogether juf, yet must be
allowed to be nearly so. Perhaps human actions and
passions, and the series of events which happen around
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lected, that it is necessary for children to be long oc-
Education. feet have been more carefully kept dry. Though he had prosecuted his studies with a design to enter into the profession of physic, yet an unfavourable opinion did he entertain of the effects produced by medical preparations on the human constitution, that he earnestly insists on the parent to beware of administering any of them to his child. From the desire which Mr. Locke discovers to have children exposed to hardships, and restrained from indulgence, in order to confirm the health and invigorate the constitution, we may conjecture him to have been an admirer of that severe mode of education which usually prevails in the earlier periods of the existence of society. He seems to have thought, that if a boy be brought up like a Huron or a Spartan, he must necessarily become robust and healthy; without reflecting, that of those children who are subjected to such a course of education, too great a proportion are unable to survive it: such is the natural delicacy of the human frame.

When he turns his attention to the cultivating of the understanding, and the forming of the character, Mr Locke still 3f deferably claims the regard of the parent and the preceptor. With a virtuous indignation he reprobes that negligence and folly by which we generally corrupt the heart and spoil the favourable to learning. ships, 

But beware of forcing their temper and desperation: when they advance farther in life. Their appetites are pampered, all their desires are gratified; and if we are at any time disposed to refuse what they ask, they have an all-powerful engine to compel our compliance with their wishes. They affult us with tears; and we then yield to their requests, however hurtful to themselves or inconvenient to us. We often floudly infract them in vicious tricks, and call forth their evil passions. At so early an age, their rage or cunning can scarcely injure us; and we reflect not that habits of perverseness and deceit must be peculiarly hurtful to themselves.

But though all the foolish desires of children ought not to be gratified, and though we should carefully avoid leading them into any bad habit; yet it is not necessary nor prudent to treat them with hardness or severity. Let them be formed to obedience from their earliest years: let them be accustomed to submit implicitly to the direction of those on whom they depend. But beware of souring their temper and depressing their spirits by harshness: and on the other hand, remember, that it is no less improper to give the boy a habit of neglecting his duty except when he is allured to it by the hopes of reward. As he advances towards manhood, and attains the use of reason; you may admit him to greater familiarity, and allow him to follow his own inclinations more than at an earlier period: and if, instead of indulging all his freaks in childhood, you have carefully accustomed him to obedience and subordination, without enforcing these by improper means, he will now be able to regulate his conduct with some degree of prudence.

But while caution is to be used in bestowing rewards and inflicting punishments; still rewards and punishments are indispensably necessary in the management of the child. Inspire your boy with a sense of shame, and with a generous thirst for praise. Carefs and honour him when he does well; treat him with neglect when he acts amiss. This conduct will produce much better effects than if you were at one time to chide and beat him; at another, to reward him with a profusion of sweetmeats and playthings.

Think not that children are to be taught propriety of conduct by loading their memory with rules, directing them how to act on every particular occasion. Burden them not with rules, but impress them with habits.

Be not devious of forming them at too early an age, to all that polite and propriety of manners which you wish to distinguish them when they become men. Let them be taught an easy, graceful carriage of body; but give yourself no concern, though they now and then blunder against the punctilios of good-breeding; time will correct their awkwardness.

With regard to that important question, whether children ought to be sent to a public school, or are likely to be better trained up in a domestic education? It is impossible for one master to extend his attention to a number of boys, and to apply the contagion of vice to be caught among the crowd of a public school, that a private seems more favourable than a public education to virtue, and scarce less favourable to learning.

When you resolve to give your son a domestic education, be careful to regulate that domestic education in a judicious manner. Keep him at a distance from evil example: choose the most favourable seasons for communicating instruction; strictly enforce obedience; but never by blows, except in case of necessity. If his engagements in life prevent the parent from superintending and directing his son's education personally, let him commit him to the care of a virtuous and judicious tutor. Let the tutor be rather a man of experience in the world than of profound learning; for it is more necessary that the pupil be formed for conducting himself with prudence in the world, and be fortified against the temptation to which he will be exposed when he enters upon active life, than that his head be filled with Latin and logic.

Here Mr Locke, notwithstanding that his own mind was stored with the treasures of Grecian and Roman literature, takes occasion to declare himself pretty freely against that application to ancient learning, which was then indispensably required in the education of youth. He considers languages and philosophy as rather having a tendency to render the youth unfit for acting a prudent and becoming part in life, than forming for it: and he therefore infists that these should be but in a subordinate degree the objects of his attention.

Let the tutor encourage the child under his care to a certain degree of familiarity; let the pupil be accustomed to give his opinion on matters relative to himself; let him be taught justice, by finding injustice to others prejudicial to himself; let him be taught liberality, by finding it advantageous; let him be rendered superior to teasing his parents or tutor with complaints, by finding his complaints unfavourably received. That you may teach him to refrain every foolish or irregular desire, be sure never to indulge his wishes, save when you find the indulgence proper for him, and convenient for yourself. Curiosity, howev
Education, ever, is a principle which ought to be industriously roused in the breast of the child, and cherished there by meeting always the readiest gratification. However you may oppose the boy's inclinations in other things, yet refuse him not a proper portion of recreation: let him indulge in play, while he continues to play with keenness and activity; but suffer him not to loiter about in littlest indolence. To restrain your child from fool-hardy courage, point out to him the dangers to which it exposes him: to raise him above timorous cowardice, and inspire him with manly fortune; accustom him from the earliest period of life to an acquaintance with such things as he is most likely to be afraid of: subject him now and then to pain, and expose him to danger; but let such trials be judiciously conducted.

Idleness or curiosity sometimes leads children to cruelty in their treatment of such animals as are placed within their power. Dogs, cats, birds, and butterflies, often suffer from their inhumanity. But when they seem inclined to such cruelty, let them be carefully watched, and let every means be used to awake their hearts to generous sensibility. Allow them to keep tame birds, dogs, &c. only on condition of their being carefully refrained from, if you wish to instill gentleness and tenderness, not only to brute animals, but also to servants and companions.

Curiosity is to be roused and cherished in the breast of the child: but by what means? Answer his inquiries readily: though his questions be put in awkward language, let not that hinder you from attending to the objects of them. Curiosity is natural to the human mind; and if you reprove not the curiosity of the child, he will often be moved by its impulse to the pursuit of knowledge. Let him find his eagerness in the pursuit of knowledge, a source of applause and esteem. Avoid the folly of those who sport with the credulity of children, by answering their questions in a judicious or decorous manner.

You must, however, not only listen with obliging attention to his questions, and strive to gratify his curiosity; but even whenever he attempts to reason on such subjects as are offered to his observation, be careful to encourage him: praise him if he reason with any degree of plausibility; even if he blunders, beware of ridiculing or laughing at him. With regard to the boy's play-things: while you indulge him freely in innocent diversions, give him such play-things as may be necessary in the amusements in which he engages, provided they be such as he cannot make himself; but it will be still better for him to exercise his dexterity and ingenuity in making them himself.

After throwing out these things concerning the general principles on which education should be carried on, Mr. Locke next proceeds to those particular parts of knowledge in which he thinks every young gentleman ought to be instructed. In virtue, wisdom, breeding, and learning, he comprehends all that is necessary to enable his pupil to act a respectable part in life.

In forming the boy to virtue, the first thing to be done, is to inform him of the relation subsisting between human creatures and a supreme independent Being, their creator, preserver, and governor; and to teach him, that obedience and worship are due to that Being. But when you inform the child of the existence of an invisible Being, beware of impressing his mind with any notions concerning spirits or goblins, which may render him incapable of bearing darkn ess or solitude. In fancy our minds are, by the indiscrimination of those about us, generally impressed with such prejudices concerning a thousand frightful forms, ever ready to assail or haunt us under the shade of night, that we become incapable of manly fortitude during the course of life: the soldier who will boldly face death in the field of battle, shall perhaps tremble and take to flight at the rustling of a few leaves, or the grunting of a hog in the dark. But were the imaginations of children not crazed with wild stories concerning spirits and goblins, darkness would be no more alarming to them than light. After informing the child of the existence of a Deity, and teaching him to pray to him; next labour to impress his mind with a veneration for truth, and habituate him to a strict adherence to it on every occasion. Endeavour also to render him gentle and good-natured.

The best means you can use to teach him wisdom or prudence in conducting himself in the ordinary business and intercourse of life, is to teach him to despise the mean shits of cunning. The rest must be learned by actual experience in life.

The decencies of life, comprehended under the word Good Breeding, form no inconsiderable part of a good education. In teaching these, two things are to be attended to: Inspire the youth with a disposition to please and oblige all with whom he is conversant; next, teach him how to express that disposition in a becoming manner. Let boisterous roughness, haughty contempt of others, censurefullness, impertinent raillery, and a spirit of contradiction, be banished from his temper and behaviour. At the same time, beware of leading him to regard the mere forms of intercourse as a matter of the highest importance. Remember that genuine good-breeding is only an easy and graceful way of expressing good sense and benevolence in his conversation and deportment.

Mr. Locke, when he comes to give his opinion concerning those parts of learning which are proper to be taught a young gentleman, and the manner in which they ought to be communicated, advises to initiate the child in the art of reading, without letting him know that he is engaged about a matter of any importance, or learning an accomplishment which you are solicitous that he should acquire. Present it to him in the form of an amusement, or teach him to consider it as an high honour to be permitted to learn his alphabet; other wise he will turn to it with disgust. When by instructing arts you have allured him to apply to reading, put into his hands such books as are plain, entertaining, and instructive. Insist not on his reading over the bible: instead of gaining any advantage from an indiffer
In this period of life, he is likely to acquire the most confused notions of religion, and an indifference for the sacred volume during the rest of life; yet it may be properly to cause him to perceive some of its beautiful religious passages, and to familiarize him with its elegant and humane precepts. After learning to read his mother-tongue, the boy's attention ought to be next directed to the art of writing. The cleft way to teach him that art, is to get a plate engraved, after the model of any hand which you think most proper for his imitation. With this plate get a number of copies cast with red ink; the letters of these the learner may trace with his pen filled with black ink; and he will thus in a short time, and without much trouble to you or himself, acquire a decent hand. As drawing is useful on many occasions in life; if the boy be not naturally incapable of acquiring it, he may with propriety dedicate some part of his time and attention to that art.

When the scholar has attained a tolerable degree of skill in writing, and in reading and speaking his native language, he must next begin an acquaintance with other languages. Among these, the first object of his study will naturally be the Latin. Yet let none waste their time in attempting to acquire a knowledge of Latin, but such as are designed for some of the learned professions, or for the life of a gentleman without a profession. To these last it may be useful; to others it is wholly unserviceable. But in learning the Latin tongue, a much happier method than burdening and perplexing him with rules of grammar, would be to make him speak it with a tutor who were sufficiently master of it for that purpose. Thus might be spend that time which is usually occupied in acquiring this language, in learning some other necessary branches of education. But if you cannot conveniently have the boy taught the language by the way of conversation, let the introductory books be accompanied with an English version, which he may have easy recourse to for the explanation of the Latin. Never perplex him with grammatical difficulties. Reflect that, at his age, it is impossible to enter into the spirit of those things. Render every thing as easy and pleasing as possible; for the attention will not fail to wander, even though you labour not to render the task disagreeable. Skill in grammar may be useful; but it is to those whose whole lives are to be dedicated to the study of the dead languages: that knowledge which the gentleman and the man of the world may have occasion to derive from the treasures contained in the ancient languages, may be acquired without a painful study of propriety or syntax. As the learning of any language is merely learning words; if possible, let it be accompanied with the acquisition of some real knowledge of things; such as the nature of plants, animals, &c. their growth and propagation. But if you cannot or will not give your boy a private education, and are all resolved to send him to school, to be whipped through the usual course of Greek and Latin; at least act with so much good sense and humanity, as to inflict that he be not burdened and tormented with the composition of Latin themes and verses. Neither let his memory be oppressed with whole pages and chapters from the classics. Such ridiculous exercises have no tendency, whatever prejudice they may urge to the contrary, to improve him either in the knowledge of languages or of nature.

Mr. Locke terms it with that the French language, which in his days had attained to higher refinement and a more regular analogy than any of the modern languages of Europe; but he seems to wish that the French were learned along with the Latin; and he wishes the study of these languages to be accompanied with the study of arithmetic, geography, history, and chronology. Let these branches of knowledge be communicated to the learner in one of the two languages; and he will thus acquire the language with greater facility. He next points out the advantages of the branches of knowledge which he recommends as proper to be learned together with the languages; but on that head he says nothing singular. One method which he recommends for facilitating the study of language is, to put into the youth's hands, as soon as he has acquired a tolerable knowledge of chronology, some of the most entertaining Latin historians; the interesting nature of the events which they relate will not fail to command his attention, in spite of the difficulty which he must find in making out their meaning. The Bible and Tully's Offices will be his best guides in the study of ethics. The law of nature and nations, as well as the civil and political institutions of his country, will form to him an important object, which he ought to study with the most careful attention. Rhetoric and logic, though generally regarded as objects of great importance in a liberal education, can neither of them contribute much, with all their rules and terms, to render him an acute reasoner or an eloquent speaker; and it is therefore unnecessary for him to honour them with any particular attention. Tully and Chillingworth will be more beneficial in teaching him to reason and to peruse, than all the treatises on rhetoric and logic which he can possibly peruse, or all the lectures on those arts which he can gain opportunities to hear. In every art and every science, practice and experience are infinitely better than rules. Natural philosophy, as contributing to inspire the breast with warmest sentiments of devotion, and serving also to many useful purposes in life, ought to make a part in the young gentleman's studies. But the humble experimental writers on that subject are to be put into his hands in preference to the lofty builders of systems. As for Greek, our pupil is not to be a professed scholar, but a gentleman and a man of the world; and therefore it does not appear necessary that Greek should make a part in the system of his education. But in none of these studies will the pupil ever attain any proficiency, unless he be accustomed to method and regularity in the prosecution of them. In languages, let him gradually ascend from what is simplest to what is most difficult; in history, let him follow the order of time; in philosophy, that of nature.

Dancing, as contributing to ease and gracefulness of carriage, ought to make a part in our young gentleman's education. Fencing and riding being fashionable, cannot well be denied him. As he is likely, in the course of life, to have some leisure hours on his hands, and to be sometimes disposed to active recreation, let him learn some mechanical trade, with the
ROSEAU. 

Education. Exercise of which he may agreeably fill up some of those hours. If he is to possess any property, let him not be unskilled in the management of accounts. Travel, instead of being useful, appears more likely to be hurtful to the understanding and morals of the traveller, unless deferred to a later period than that at which young men are usually sent out to complete their education by traversing through foreign countries.

Here Mr. Locke concludes his work with observing, that he does not offer it to the world as a full or comprehensive treatise on the subject of education; but merely as the outlines of what occurred to him as most proper to be observed in breeding up a young gentleman not intended for any learned profession or mechanical employment, but for acting a respectful part in life at the head of a competent hereditary fortune.

In considering the sentiments of this respectable philosopher on the subject of education, we perceive, that as he was, on the one hand, superior to those prejudices which render us incapable of distinguishing the defects or absurdities of any custom or institution which has long prevailed; so, on the other hand, he was free from that silly vanity which disposes those who are subject to its influence to affect novelty and singularity of sentiment on every subject which they consider. Though a member of one of the universities, he hesitates not to declare himself against a very laborious attention to classical learning; and his reasoning is, through the whole of his treatise, rather plain and solid than subtle or refined.

Yet, however we respect the soundness of his understanding or the benevolence of his intentions, we cannot avoid observing, that his opinions are not always such as experience justifies. He had no doubt taken notice of some instances in which the too great anxiety of parents about the preservation of their children's health was the very means of rendering their constitution feeble and tender through the course of life; and from that circumstance might be led to pro-pose those expedients which he mentions for preserving the health and strengthening the constitution of children. But little more observation or inquiry would have easily convinced him, that some of his expedients, instead of strengthening the child's constitution, would in all probability shorten his days.

He had perhaps seen some of the heroes of classical literature, who were familiar with Demosthenes and Cicero, and had Homer and Virgil at their fingers ends,—he had seen some of those gentlemen overloaded with their cargo of Greek and Latin as to be unfit for the ordinary business and intercourse of life; and such instances might tempt him to forget the advantages which he himself and a long series of philosophers, patriots, and statesmen, with whose names the annals of his country are adorned, had derived from a regular classical education. But as we are afterwards to deliver our own sentiments on this subject, we will not here extend our observations on Mr. Locke to a greater length.

An author more distinguished than Mr. Locke, for tenderness of sentiment, singularity, eloquence, and whim, has presented the public with a work on the subject of education, in which he, with unexampled boldness, inveighs against all the established modes, as well as reprobates whatever had been advanced by former writers on the subject; and, at the same time, delineates a plan of education which he would persuade us Education is infinitely superior to those which he exploded. This writer is the amiable and pathetic Rousseau: And tho' he be often vain, paradoxical, and whimsical; yet the charm of genius and sentiment which adorns his writings will at least engage our attention while he unfolds his opinions.

He sets out with observing, that our business in the management of children in infancy, should be, to second and to call forth nature; and that, instead of this, we always oppose her intentions and operations. As soon as the child feels the light, he is wrapped in swathing bands. His limbs are thus restrained from that free motion which is necessary to their growth and vigour; and even the internal parts of his frame are rendered incapable of their proper functions. Mothers are too proud or indolent, or too fond of gaiety and dissipation, to submit to the task of nursing their own children. The poor infants are committed to some hired nurses, who not being attached to them by natural affection, treat them with negligence or inhumanity. But that mother capable of any delicacy of sentiment, who can permit another to fiddle her child, and to share with her, or perhaps wholly supplant her, in the affections of the child?

Again, when parents undertake the care of their infant children, they often injure them by mistaken tendernefs. They pamper them with delicate meats; cover them with warm clothes, and anxiously keep them at a distance from all that has the appearance of danger; not attending to the economy of nature, who subjects us in infancy to a long train of epidemic distempers, and exposes us during the same period to innumerable dangers; the design of which doubles is, to teach us a prudent concern for our own safety, and to strengthen and confirm our constitutions.

A child no sooner enters into life, than it begins to cry; and during a great part of infancy continues frequently to shed tears. We either attempt to soothe it into good nature, or seek to silence it by harsher means; and it is thus we infuse into its infant mind those evil passions which we afterwards presume to impute to nature.

As the mother generally disdains to nurse her own child, so the father is seldom at leisure to take any share in the management of his education: he is put into the hands of a tutor. But that tutor whose whole time and attention can be purchased for money is unworthy of the charge. Either be yourself your son's preceptor, or gain a friend whose friendship to you shall be his sole motive to undertake the task.

After a few preliminary observations to the above management, our author introduces his Emilinus, in whose education he delineates that plan which he prefers. The preceptor whom he would assign Emilinus must be young; and must dedicate his attention to Emilinus alone, from the time when his pupil enters the world till he attains the full age of manhood. Emilinus, to receive the full benefit of his preceptor's system of education, and to afford full scope to it, must possess a genius of the middle clats; no prodigy of parts, nor singularly dull; he must have been born to affluent circumstances and an elevated rank in life. His preceptor is invested with the rights, and takes upon him the obligations, of both father and mother. Emilinus is, when put into
Education into the hands of his preceptor, a well-shaped vigorous, and healthy child. The first care of the preceptor is to provide him with a nurse, who, as he is new-born, must be newly delivered: it is of full higher importance that he be clean, healthy, virtuous, and of mild dispositions. While fucking her charge, the shall feed plentifully, chiefly on a vegetable diet. The child must be frequently bathed, in cold water if possible; if you begin with warm, however, use it by degrees colder and colder, till at length he is able to bear it entirely cold. He is not to be wrapped in swaddling-clothes or rollers, or bound with stays—bands; but put in good warm blankets and in a roomy cradle: Let him stretch and move his limbs at freedom, and crawl about on hands and knees at his pleasure. The greatest care must now be taken to prevent the child from contracting any habits whatever: Suffer him not to use one arm more than another, or to eat or sleep at falted hours. Prepare him for the enjoyment of liberty, by preferring to him the exercise of his natural abilities, unfeer by any artificial habits.

As soon as the child begins to distinguish objects, let his education begin. Some objects are naturally agreeable, others frightful. Accommod him to look upon any object that may come in his way without being affrighted. Children are at first ignorant of local relations, and learn to distinguish them only by experience, and while Emilius is yet an infant, incapable of speaking or walking, he may be affaited in acquiring the knowledge of these.

In his feeble helpless condition, the child must feel many wants and much uneasiness; tears are the language which nature has given him to make known his diftresses and wants. When the child cries, it would be much more prudent and humane to examine what he suffers or stands in need of, than, as is usually done, to rock or fign him asleep; or, when these means succeed not, to threaten or ufe him brutally.

In managing children, as nature has endowed them with no superfluous powers, we ought not to confine them from the free ufe of them which they are able to exert. It is our duty to fupply their deficiency both of mental and bodily powers: but while we are ready to administer on every occasion to their real wants, we must beware of gratifying their caprice or unreasonable humours. In order to distinguish between their natural and fantaffic wants, we must study the language and figns by which they express their wishes and emotions. Though crying be the means which nature has given infants to enable them to procure relief or affiance, yet when they cry they are not always in need of either. They often cry from obfcurity or habits of peevifhnefs. But if, instead of attempting to foophone them by diverfing their attention to other objects, we would on fuch occasions entirely neglect them, they would soon ceafe to indulge in fuch fits of crying.

When children begin to fpeak, we are ufually anxious about their language and articulation, and are every moment correcting their blunders. But instead of hoping to teach them purity or correctness of speech by fuch means as thefe, let us be careful to fpeak fayly and correfently before them, and allow them to express themselves in the beft manner they can. By fuch means we will be much more likely to obtain our wishes in this matter. When they fpeak, let us not listen with fuch solicitude as to relieve them from the occultility of using an open difficult articulation.

When the child attains the power of expressing himself in natural language, he may then be considered as having reached the second period of infancy. He needs not now to make known his wants by tears, and should therefore be discouraged from the ufe of them.

Let his tears be entirely neglected. He now begins to run about, and you are anxious to prevent him from hurting himself; but your anxiety can only render him peevifh or timid. Remove him from any very alarming danger, and then suffer him to run about at his pleasure. He will now and then bleed, and hurt himself; but he will become bold, lively, and cheerful.

In regulating the conduct of your child, let him be permitted to authorize to authority to know that he is dependant; but require not of him an implicit submission to your will. Let his unreasonable desires be opposed only by his natural inability to gratify them, or by the inconveniences attending the gratification. When he asks what is necessary or reasonable, let him infantly obtain it; when he asks what is unreasonable or improper, lend a deaf ear to all his treaties and demands. Beware of teaching him to exftabish his authority over you by means of the forms of politeness. A child will fearce take the trouble to address you with If you pleafe, unless he has been made to regard thefe as a set of magic syllabufs, by the ufe of which he may subjeft every perfon to his will. His If you pleafe, then means I pleafe; pray, with him, hands for you. Though you put in his mouth the words of humility, his tone and air are thofe of authority that will be obeyed.

Sacrifice not the prezent happiness of your child for the fake of any diftant advantage.

Be not too anxious to guard him againft natural evil. The liberty which he enjoys while he is now and then permitted to expose himfelf to blows, or cold, or wethefs, is more than aufficient compenfation for all that he thus fuffers.

Seek not to imprefs him with ideas of duty or obligation. Ideas of duty and obligation are incapable of any notions of the diftinctions of morality. Avoid therefore even the ufe of the terms by which thefe arc expressed in their hearing. While they continue to be affected only by fensible objects, seek not to extend their ideas beyond the sphere of fenfation. Try all the powers of language, ufe the plainft and moft familiar methods you can contrive; you fhall still be unable to give the boy at this age any just ideas of the diftinctions between right and wrong. He may readily conceive, that for one fct of actions you will punish him, and that by another he will obtain your approbation; but farther than this his ideas of right and wrong, of virtue and vice, cannot yet be caried.

The powers of the human mind are gradually unfolded. At firft, the infant is capable only of perception; by and by, his infinils and passions begin to exert their forces; at length, as he advances towards manhood, reafon begins to act, and he becomes able to feel the beauty of virtue and the deformity of vice.

But though you seek not to regulate his conduct by
by notions of duty, yet let him feel the yoke of necessity. Let him know, that as he is weaker than you, he must not, therefore, expect that he should be subject to his will; and that, as he has neither skill nor strength to control the laws of nature, and make every object around him bend to his pleasure, he cannot hope to obtain the gratification of all his wishes. Thus you teach him virtue before he knows what virtue is; and call forth his reason without misleading or perverting it. Let him feel his impotence; but forbid him not to think, that if he had power there would be no reason why he might not at pleasure even turn the world upside down.

Hitherto you have given your pupil no verbal instructions, nor must you attempt to instruct him by any other means than experience; let all his knowledge be literally of his own acquisition.

Let not the parent who has observed the conduct of children brought up in the usual way be afraid that, if his child should be treated like our pupil, he would become stupid and vicious. Nature sends not human beings into the world with a predisposition to vice: we sow the seeds of it in the infant heart; and by our absurd modes of treatment, we also enfeebles and pervert the powers of the understanding.

But from the hour of his birth till he attain the age of twelve, the education of Emilius shall be purely negative. Could we but bring him up healthy and robust, and entirely ignorant, till that period, the eyes of his understanding would then be open to every lesson: free from the influence of habit and prejudice, his passions would not then oppose us; and we might render him the wifeft and most virtuous of men. If we can but lose time, if we can but advance without receiving any impressions whatever, our gains are unspreakable. Nature gives the powers of every mind some particular direction: but that particular bias, imprired by the hand of nature, cannot be distinguished before the period we have mentioned; and if you counteract nature, instead of seconding her views, the consequences cannot but be highly unfavourable both to the heart and the understanding of your pupil.

Perhaps, in the midst of society, it may be difficult to bring up our pupil without giving him some idea of the relations between man and man, and of the morality of human actions. Let that, however, be deferred as long as possible.

Were Emilius to witness a scene of anger, and to ask the cause of the appearances which he beheld, he should be told that the persons were acted with a fit of fury. We might thus perhaps prevent the unhappy effects of such an example.

The first moral notions which should be communicated to the child are those of property. To communicate the idea of property to our pupil, we will direct him to take possession of something; for instance, of a piece of ground belonging to some other person, and in a state of cultivation. Let him cultivate this spot of ground anew, sow it with seeds, and look eagerly forward to the time of harvest in the hopes of reaping the fruit of his labors. In the mean time, let the proprietor of the ground take notice of what is done, destroy your pupil's rising crop, and complaint of the injustice done him. While the boy laments his loss and the disappointment of his hopes, in all the bitterness of grief, let the proprietor of the ground, still insist on the injury done him, and complain of what he suffers by the purpose for which he himself had cultivated and tilled the ground being frustrated.

Our pupil, now sensible of the reasonableness of the other's claims, will desist from his lamentations, and only beg to have some other spot assigned him which he may cultivate at his pleasure without offending any person. This he will justly consider as his own property, to the productions of which raised by his own labour he has an exclusive right, and in the occupying of which none ought to molest him. In some such manner as this may the nature of property, the idea of which easily refers in this instance to the first occupier, and afterwards the exchange of property, be explained to him.

Another instance of the manner in which the pupil is now to be managed may not be improper in this place. He is possibly so rude and boisterous as to spoil or break whatever is within his reach. Be not angry with him, however, if he breaks the utensils which he has constant need of; be in no haste to supply him with others in their room: let other things be removed out of his way: if he breaks the windows of his apartment, let him be expo'd night and day to the cold; complain not of the inconvenience yourself, but order matters so that he may feel it. After some time, let them be mended up; and if he break them again, change your method. Tell him calmly, "These windows are mine; I took care to have them put there; and I will prevent their being again broken, by confining you in a dark room." Let all his endeavours to avoid this prove ineffectual. Let him be actually confined, and be liberated only on proposing and agreeing to the condition of breaking no more windows. When he proposes this condition, be ready to listen to him; observe that it is well thought on, and that it is a pity he did not think of it sooner. Consider this engagement between you as sacred; treat him as before, and you cannot fail to attain the end in view.

The moral world now opens to us: But no sooner are we able to distinguish between right and wrong, than we become defirous to conceal those infinaces in which we act wrong. Lying is therefore a vice of which your pupil is now apt to be guilty: you cannot always prevent, but you can punish; but let the punishments which you inflict appear to the child only the natural consequences of his conduct. If he is in any infinace convicted of a lie, let his affections no longer gain credit. By this means, sooner than by precepts, or any other species of punishments, will you be able to reclaim him from the habit of lying.

The methods generally taken to render children virtuous are preposterous and foolish. To render them generous and charitable, we give them money, and bid them bestow it in alms, while we ourselves give nothing but the parent or master, and not the child, should bestow the alms. Example might produce the wished for effect. Besides, children are strangers to the value of money. A gingerbread cake is more to them than an hundred guineas. Though you teach them to give away money, till you persuade them to part readily with those things which they value most, you do not inspire them with generosity. Would you make them liberal by
In every thing let him be habituated to what is proper to be put into the hands of boys.

The only lesson of morality that can with any propriety be inculcated on children, is to injure no person. Even the positive precept of doing good, must be considered as subordinate to this negative one of doing no harm. The most virtuous and the most exalted of characters, is the man who does the least harm to his fellow-creatures.

In a public education, it will be necessary to attempt the communication of moral instruction at an earlier period than in a private one. In a private education, it will always be best to allow the moral powers of children to ripen as much as possible before you endeavour to inform and direct them by precepts.

There is an equality among geniuses; and fond mothers and fathers may be induced to plead for exceptions in favour of such of their children as they view with a partial eye. "This boy's mind is more capacious, his powers are riper, than those of others." But however great the seeming disparity of geniuses may be, it is at bottom but inconsiderable. Let the age of children be therefore regarded as a common measure by which their treatment is to be regulated.

However quick and tenacious the memories of children may seem, they can derive little advantage from the exertions of memory till such time as judgment begins to act. All the knowledge that they acquire in the course of the usual system of education, is merely the knowledge of words. The languages, geography, chronology, in short all that they are taught, and called to display so opportunely at this period of life, serve no other purpose than to fill their minds with words.

History is esteemed a proper thing to be put into the hands of children. But except you wish to confine their attention to the external and physical actions, it is almost nothing they can acquire by the perusal of it. And if devoted of the moral distinctions of actions, of the workings of the passions, and the complication of interests, what is there to render history entertaining? We may indeed easily teach them to repeat the words kings, emperors, wars, conquests, resolutions, laws; but of the things which you use these words to denote, you will find they are hitherto incapable of forming any clear ideas.

But the mere knowledge of words is not science; make your pupil acquainted with things, and he will not fail to acquire their names. Emilius must never be fitter to get any composition by heart, not even tables: be careful to place before him those scenes and objects, the images of which it may be useful for him to have impressed on his memory; but by no other means seek to afflict him to improve that faculty.

Emilius shall not even learn to read till he attain the age of twelve: for, before that period, it can be of no benefit to him; and the labour would only make him unhappy during that period of life which is naturally the golden part of our days. But when he has attained the proper age, matters shall be so ordered, that he shall find his ignorance of letters an inconvenience. A card shall be fast him, which being unable to read, he will apply to some of those about him. They may be unwilling to oblige him, or otherwise engaged. If, at length, it is read to him, that may be well; it is now too late to take advantage of that agreeable invitation which it contained. This may be two or three times repeated. At length he becomes eager to learn to read; and accomplishes that almost without assistance.

The only principle on which we proceed, is to leave the pupil almost wholly under his own direction, seemingly at least; to lead him to acquire new accomplishments, solely from the desire of increasing his powers, and extending his influence; and humbly to follow nature, not to force her.

As we are desirous of cultivating his understanding, the means which we employ for that purpose is, to cultivate those abilities on which it depends; he is always active and in motion. Let us first make him a man in point of health and vigour, and he will soon become a man in understanding.

By our constant attention to the welfare of children, we render it unnecessary for them to attend to it themselves. What occasion has your son or pupil to observe whether the aspect of the sky threaten rain, when he knows that you will take care to have him sheltered from a shower? or to regulate the length of his excursions, when he is sure that you will not suffer him to lose his dinner?

While matters are so ordered that Emilius thinks himself subject only to his own will, though all his motions are regulated according to your pleasure; instead of becoming fantastic and capricious, he instinctly acquires the habit of keeping utility in view in all his actions.

The first objects which engage the attention of children are the appearance of the material world around them: our first study is a kind of experimental philosophy; our instruments and instructors are our hands, our feet, and our eyes. By exercising these bodily organs, the boy will acquire more real knowledge even in the period of childhood, than if we should dedicate nine-tenths of his time to books, from the age of fix to fixity. All who have examined, with any gacy, the characters, circumstances, and manners of the ancients, have agreed in attributing to their gymnastic exercises that superior strength of body and mind which renders them the objects of admiration to the moderns.

Our pupil's clothes cannot be too light and easy. If tight and close, they fetter and confine his joints and limbs, and likewise obstruct the circulation of the blood; if accustomed to warm clothing, he will soon become incapable of bearing cold.

In every thing let him be habituated to what is plain and hardy. Let his bed be coarse and hard, his and exercise clothes plain, his fare simple. Infants must be freely clad, indulged in sleep; but as Emilius is now advanced beyond infancy, he must be accustomed at times to go to bed late and get up early, to be sometimes hastily waked from sleep; and thus to prepare himself for what he may afterwards have occasion to submit to in the course of life.

As this period is in a particular manner that of exercise, and Emilius is encouraged to take as much exercise as he chooses; we must endeavour to prompt, our
Swimming, though not generally attended to, is yet one of the first which a boy ought to learn. It may, in many occasions in life, be of the greatest advantage, by enabling us to save our own life or the life of other. Emilius shall be taught to swim; he shall be taught whatever can really enlarge the sphere of his power: "could I teach him to fly in the air, I would make him an eagle; if to bear the fire, a fal- mander."

To exercise the senses is not merely to make use of them; it is to learn to judge by them. Call not your pupil to exert all his strength on every occasion; but let him learn to judge of the truth of what he receives from one sense, by having recourse to the evidence of another.

It is not impossible to improve the senses to an higher degree of perfection than that which we usually attain. Blind men generally polys of the sense of touch in a more exquisite degree, than we who have also eyes to guide and inform us. But they acquire this superior delicacy and acuteness of sensation, only by their finding it necessary to have more frequent recourse to the information of that sense. Here is then a wide field for improvement and agreeable exercise to our pupil.

What a variety of useful diversions might he be led to entertain himself with in the course of the night! The hours of darkness are generally hours of terror, sooner than by any others. 33

Darkness. The hours of darkness are generally hours of terror, sooner than by any others. 33

The imagination calls up dangers on all hands.

The months of darkness are generally months of terror, not only to men, but also to the brute animals. Even Geometry, when taught in the usual way, is insufficient to render us superior to the terror which darkness along with us infires. There is a wide field for improvement and agreeable exercise to our pupil.

What a variety of useful diversions might he be led to entertain himself with in the course of the night! The hours of darkness are generally hours of terror, not only to men, but also to the brute animals. Even Geometry, when taught in the usual way, is insufficient to render us superior to the terror which darkness infires. This timidity is usually attributed to the tales of ghosts and goblins with which we are frightened in infancy. But it originates from another cause; our ignorance of what is passing around us, and our inability to distinguish objects during that period of darkness. The passion of fear was implanted by nature in the human breast, in order that it might serve to put us on our guard against danger. But in consequence of our being subjected to the influence of that passion, when we are ignorant of what surrounds us, imagination calls up dangers on all hands. And such is the cause from which our terror in darkness naturally arises.

But the only way to free our pupil from this tyranny of imagination, is to oppose to it the power of habit. A bricklayer or tyler is never giddy on looking down from the roofs of houses. Neither will our pupil be alarmed by the terrors of darkness, if he be accustomed to go frequently abroad under night. It is easy to contrive a number of little amusements, the agreeableness of which may, for a time, overcome our pupils aversion for darkness; and thus may a habit be at length impreted.

Let us give yet another instance of the means by which children may be led to do what we wish, without imposing any restraint on their will. Suppose Emilius is lazy and inactive, and we wish to make him learn to run. When walking out with the young flaggad after dinner, I would sometimes put a couple of his favourite cakes in my pocket; of these each of us should eat one in the course of our walk. After some time I would show him I had put a third cake in my pocket. This he would not fail to ask after finishing his own: no, says I, I can eat it myself, or we will divide it; or flay, we had better let these two little boys there run a race for it. Accordingly I propose the race to the boys; who readily accept the conditions, and one of them carries off the prize. After seeing this several times repeated, Emilius begins to think himself qualified to obtain the third cake as well as any of the little boys, and to look upon running as an accomplishment of some consequence. He secks an opportunity of being permitted to enter the lifts. He runs; and after being two or three times outstripped, is at length successful, and in a short time attains an undoubted superiority.

As children naturally imitate almost whatever they see, they are often disposed to attempt drawing. In this our pupil might be indulged, not merely for the sake of the art, but to give him a steady hand and a good eye. But he should draw from nature, not from other drawings or from prints. Were he to draw the likeness of a horse, he should look at the animal: if to attempt a representation of a house, he should view the house itself. In this method he will, no doubt, scratch for a long time without producing any likeness; but he will acquire what we proposed as the ends of his attempting to draw; namely, steadiness of hand and judgment of light, by this method, sooner than by any others.

Geometry, when taught in the usual way, is certainly above the capacity of children; they cannot go along with us in our reasoning: Yet they are not totally incapable of acquiring even this difficult science; if, when they are prosecuting their amusements, you lead them in the first instance of the circle, the triangle, and the square, and place them in circumstances when they may have occasion to apply their knowledge of these to real uses in life.

A child has been taught the various relations between the outlines of surfaces, and contents of bodies, by having cakes set before him, cut in all manner of regular folds; by which means he was led to master the whole science of Archimedes, by studying which form contained the greatest quantity.

There is a period between infancy and the age of puberty at which the growth and improvement of our faculties exceed the increase of our desires. About or 13, when the appetite for the sex has not yet begun to make itself felt, when unnatural wants are yet unknown, no false appetites yet acquired; at that period, though weak as a child, a man is strong.

This interval, when the individual is able to effect more than is necessary for the gratification of his wishes, contains the most precious moments of his life, which ought to be anxiously filled up in an useful manner. This is the best time for employment, for instruction, for study.

Now, let us begin to consider what is useful; for, hitherto, we have only inquired what was necessary. In entering on our studies, we will make no account of any but such as distinctly direct us to purpose: those which the pedants and the pretended philosophers are
The earth which we inhabit, and the sun by whose beams we are enlightened, are the first objects which claim our attention. We will therefore direct the attention of our pupil to the phenomena of nature. We will lead Emilius out on some beautiful evening to behold the setting sun. Here we take particular notice of such objects as mark the place of his going down. Next morning we visit the spot to contemplate the rising of the glorious luminary. After contemplating for some time the successive appearances which the scene before us affumins, and making Emilius observe the hills and the other surrounding objects, I stand silent a few moments, affecting to be occupied in deep meditation: At last I address him thus: "I am thinking, that, when the sun set last night, it went down yonder: whereas this morning, you see he is risen on the opposite side of the plain here before us. What can be the meaning of this?" I say nothing more at this time, but rather endeavour to direct his attention to other objects.

This is our first lesson in cosmography.

Our last observation was made about Midsummer; we will next view the rising sun on some fine morning in the middle of winter. This second observation will be made on the very same spot which we chose for our former. When Emilius and I perceive the sun now emerging above the horizon, we are struck at the change of the place of his rising. By such lessons as these may the pupil be gradually taught that of the first objects of education in which all the natural wants of man are displayed in a manner suitable to the understanding of a child, and in which the means of satisfying those wants are gradually displayed with the same ease and Crusoian simplicity; such a book will be worthy of his most attentive study. There is such a book to be found; but it is neither Aristotle, nor Pliny, nor Buffon; it is Robinson Crusoe. Emilius shall have the adventures of Robinson put into his hands; he shall imitate his example; even affect his dress; and, like Robinson, learn to provide for himself without the aid of others.

Another employment of Emilius at this period shall be, to visit the shops of various artisans; and when he enters a shop, he will never come out without lending a hand to the work, and understanding the nature and the reason of what he sees going forward.

Still, however, we are careful to afford not a hint concerning those social relations the nature of which he is not yet able to comprehend.

The value and importance of the various arts are ordinarily estimated, not according to their real utility, but by a very injudicious mode of estimation: Those which contribute in a particular manner to the gratification of the fantastic wishes of the rich, are preferred to those which supply the indispensable necessities of life. But Emilius shall be taught to view them in a different light. Robinson Crusoe shall teach him to value the stock of a petty ironmonger above that of the most magnificent toy-shop in Europe. Let us establisht it as a maxim, that we are to lead our pupil to form just notions of things for himself, not to dictate to him ours. He will estimate the works both of nature and art by their relation to his own convenience; and will therefore regard them as more precious than gold—a shoemaker or a mason, as a man of more importance than the most celebrated jeweller in Europe.

The intercourse of the arts consists in the reciprocal exchange of industry; that of commerce, in the change of commodities; and that of money in the exchange of bills and cash. To make our pupil comprehend the nature of these, we have now only to generalize and extend to a variety of examples those ideas of the nature of property, and of the exchange of property, which we formerly communicated to him. The nature of money, as bearing only a conventional value, which it derives from the agreement of men to use it as a sign for facilitating commerce, may be now explained to Emilius, and will be easily comprehended by him. But go no further: seek not yet to explain to the child in what manner money has given rise to the numerous chimeras of prejudice and caprice; nor how countries which abound most in gold and silver, come to be the most detestible of all.

Still our views are directed to bring up our pupil in such a manner that he may be qualified to occupy any place in the order of society into which even the ca­price of fortune can throw him. Let us make him a man; not a slave, a lord, or a monarch. How much superior the character of a king of Syracuse turned into schoolmaster...
The propriety of making a young man, whatever his sphere of life, learn a trade.

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New measures to be adopted in the education of a friend.

As hitherto we have been careful not to force or anticipate nature, so even now our attention must be directed to divert the impulses of that dangerous appetite which now begins to make itself felt. To confine the growing passions within proper limits, let it be our care to defer as long as possible the time at which they begin to display themselves. For this purpose, let us cautiously guard our words and actions in the presence of our pupil. Let us be careful to give him no premature instructions.

To excite and cherish that sensibility of mind which now first begins to show itself, to extend the care of the youth beyond himself, and to interest him in the welfare of his fellow creatures; let us be careful to put such objects in his way as have a tendency to call forth and refine his feelings. It is not possible for the human heart to sympathize with those who are happier than ourselves; our sympathy is moved only by the sight of misery. We pity in others only those distresses
Books, solitude, idleness, a sedentary and effeminate life, the company of women and young people, are what he must carefully avoid at this age. He has learned a trade, he is not unskilled in agriculture; to please those may be means, but not our only means, for preferre serving him from the impulse of sentimental desire. He is too familiar with the other; he can exercise them without taking the trouble to reflect; and while his hands are busy, his head may be engaged about something quite different from that in which he is employed. He must have some new exercise which may at once fix his attention and cause him to exert his bodily powers. We can find none more suitable for this purpose than hunting. Now, therefore, Emilius shall eagerly join in the chase; and though I do not wish him to acquire that cruelty of disposition and ferocity of temper which usually distingiuish those who dedicate their lives to that barbarous diversion, yet at present it may have the happiest effects in suspending the influence of the most dangerous of pursuits.

When I have now conducted my pupil so far; have informed him of what I have done for him, and of the difficulty of his situation; and have resigned my authority into his hands; he is sensible of the dangers to which he is exposed, and of the tender solicitude with which I have watched over him, that he will wish to continue under my direction. With some feigned difficulty I again refuse the reins. My authority is now established. I may command obedience; but I endeavor to guard against the necessity of using it in this manner.

To preferve him from indulging in licentious pleasures, I let him know that nature has designed us for living in a state of marriage, and invite him to go in search of a female companion. I will describe to him the woman whom he is to consider as worthy of his attachment in the most flattering colours. I will array her in such charms, that his heart shall be hers before he has once seen her. I will even name her: her name shall be Sophia. His attachment to this imaginary fair one will preferve him from all the allurements of unlawful love. Besides, I take care to inspire him with such reverence for himself, that, notwithstanding all the fury of his desires, he will not condescend to pursue the enjoyments of debauchery. And though I may now sometimes entrust him to his own care, and not seek to confine him always under my eye; yet still I will be cautious to watch over his conduct with careful circumspection.

But as Emilius is to be shortly introduced to his Sophia, it may perhaps be proper for us to inquire into her character, and in what manner she has been brought up.

There is a natural difference between the two sexes. The difference in the structure of their bodies shows them to be defined by nature for different purposes in the two sexes, and must necessarily occasion a distinction between their characters. It is vain to ask which of them merits the pre-emience: each of them is peculiarly fitted to answer the views of nature. Woman is naturally weak and timid, man strong and courageous; the one is a dependent, the other a principal. As the guardian of her virtue, and a restraint on her desires, woman is armed with native modesty. Reason is the guide and governor of man. When a man and a woman
Education.

man are united by conjugal vows, a violation of those vows is evidently more criminal in the woman than in the man. The wife ought to be answerable for the sentiments of the offspring with which she has been entrusted by nature. It is no doubt barbarous and wicked for the husband to demand his wife of the only reward which she can receive from the severest duties of her sex; but the guilt of the faithless wife is still more atrocious; and the consequences of her infidelity are still more unhappy.

But if nature has established an original distinction between the characters of the two sexes; has formed them for different purposes, and assigned them different duties; it must follow, that the education of the one sex ought to be conducted in a manner different from that of the other. The abilities common to the two sexes are not equally divided between them; but if that share which nature has distributed to woman be scantier than what she has bestowed on man, yet the deficiency is more than compensated by the qualities peculiar to the female. When the woman confines herself to avert her proper rights, she has always the advantage over man; when she usurp those of the other sex, the advantage is then invariably against her.

But we require not that woman should be brought up in ignorance. Let us consider the delicacy of her sex, and the duties which she is defined to perform; and to these we may accommodate the education which we bestow upon her. While boys like whatever is attended with motion and noise, girls are fond of such decorations as please the eye. Dolls are the favourite plaything of the sex in their infant years. This is an original taste, of the existence of which we have the plainest evidence. All therefore that we ought to do is, to trace and bring it under proper regulation. Allow the girl to decorate her baby in whatever manner she pleases; while employed about that, she will acquire such skill and dexterity in those arts which are peculiar to her sex, that with scarce any difficulty she will acquire needle-work, embroidery, and the art of working lace. Her improvements may even be extended as far as designing, an art somewhat connected with taste in dress; but there is no reason that their skill in this art should be carried farther than to the drawing of foliage, fruits, flowers, drapery, and such parts of the art as bear some relation to dress. Always assign reasons for the employment which you give to young girls, but be sure you keep them constantly busy. They ought to be accustomed to laborious industry, as well as to bear the abridgment of their liberty. Use every art to prevent their work from becoming disagreeable to them. For that purpose, let the mother be careful to make herself agreeable. A girl who loves her mother or her aunt, will work cheerfully by them all day; while she to whom her mother is not dearer than all the world besides, seldom turns out well. Never suffer girls, even at their diversions, to be entirely free from restraint, nor allow them to run from one amusement to another. If you now and then detect your daughter using a little artifice to excuse herself from obedience, reflect that artifice is, in a certain degree, natural to the fair sex; and as every natural inclination, when not abused, is upright and good, why should it not be cultivated? In order to give girls proper notions of dress, let them be taught to consider splendor and elegance of dress as designed only to conceal the natural defects of the person; and to regard it as the noblest triumph, the highest praise, of beauty, to shine with unborrowed lustre in the simplest attire. Forbid not young women to acquire those arts which have a tendency to render them agreeable. Why refuse them the indulgence of learning to dance, to sing, and to study such other accomplishments as afterwards enable them to entertain their husbands? Girls are more disposed to prattle, and at an earlier age, than boys. We may now and then find it necessary to restrain their volatility. But the proper question to them on such occasions is not, as to boys, Of what use is this? but What effects will this produce? At this early period, when they are yet strangers to the distinction between good and evil, and therefore unable to form a just judgment concerning any person's conduct, we ought to restrain them carefully from saying what may be disagreeable to those with whom they converse.

Girls are no less incapable than boys of forming distinct notions of religion at an early age. Yet, and even for that very reason, religious instruction should be communicated to them much sooner than to the youth of the other sex. Were we to wait the period when their mental faculties arrive at maturity, we might perhaps lose the happiest time, from our inability to make a right distinction. Since a woman's conduct is subject to public opinion, her belief ought therefore to depend, not on reason, but on authority. Every girl ought to follow the religion of her mother, every married woman that of her husband. They cannot derive a rule of faith from their own inquiry. Let us therefore teach, not so much to instruct them in the reasons of our belief, as to give them clear distinct notions of those articles which we require them to believe. Be more careful to instruct her in those doctrines which have a connection with morality, than in those frivolous articles which we are required to believe, though we cannot comprehend them.

Such are the principles on which the education of Emilius's unknown mistress has been conducted.
Education. concerning the propriety of sending young people to travel, in order to complete their education. The multiplicity of books is unfavourable to real knowledge. We read with avidity, and think that by reading we render ourselves prodigiously wise. But we impose on ourselves: the knowledge which we acquire from books is a false species of knowledge, that can never render us truly wise.

To obtain real knowledge, you must observe nature with your own eyes, and study mankind. But to gain this knowledge by travelling, it is not necessary that we should traverse the universe. Whoever has seen ten Frenchmen, has beheld them all; and whoever has surveyed and compared the circumstances and manners of ten different nations, may be said to know mankind.

To pretend that no advantages may be derived from travelling, because some of those who travel return home without having gained much real improvement, would be highly unreasonable. Young people who have had a bad education, and are sent on their travels without any person to direct or apprehend their conduct, can not be expected to improve by visiting foreign countries. But they whom nature has adorned with virtuous dispositions, who have been so happy as to receive a good education, and go abroad with a real design of improvement, cannot but return with an increase of virtue and wisdom. In this manner shall Emilius conduct his travels. To induce him to improve in the most extensive manner, that time which he should spend in travelling, I would let him know, that as he had now attained an age at which it might be proper for him to form some determination with regard to the plan of his future life, he ought therefore to look abroad into the world, to view the various orders in society, to examine the various circumstances of mankind, under different forms of government, and in different parts of the globe; and to choose his country, his station, and his profession. With these views shall Emilius set out on his travels; and with these views, in the course of our travels, we shall inquire into the origin of society and government, into the nature of those principles by means of which men are united in a social state, into the various circumstances which have given rise to so many different forms of government, and into the necessary relation between government and manners. Our stay in the great towns should be but short: for as in them corruption of manners has risen to a great height, and dissipation reigns, a long stay in any great town might be fatal to the virtuous dispositions of Emilius. Yet his attachment to Sophia would be alone sufficient to save him from the dangers to which his virtue is exposed. A young man must either be in love, or be a debauche. Incidents may be pointed out in which virtue has been preserved without the aid of love; but to such instances I can give little credit.

Emilius, however, may now return to his Sophia. His understanding is now much more enlightened than when he set out on his travels. He is now acquainted with several forms of government, their advantages and defects, with the characters of several different nations, and with the effects which difference in circumstances may be expected to produce on the characters of nations. He has even been so fortunate as to get acquainted with some persons of merit in each of the countries which he has visited. With these advantages gained, and with affections unchanged and unabated, he returns to his Sophia. After having made him acquainted with the languages, the natural history, the government, the arts, customs, and manners, of many countries, Emilius eagerly informs me that the period which we had defined for our travels is now expired. I ask, What are then your purposes for life? He replies, that he is satisfied with the circumstances in which nature has placed him, and with my endeavours to render him independent on fortune, and wishes only for his Sophia to be happy. After giving him a few advice for the regulation of his conduct in life, I conduct him to his Sophia, and behold him united with her in marriage. I behold him happy; with affectionate gratitude he blesses me as the author of his happiness; and I thus receive the reward of all the pain with which I have conducted his education.

Such are the outlines of the system of education proposed by this singular and original genius. For originality of thought, affecting elegance, enchanting description, and bold vehemence eloquence, this book is one of the noblest pieces of composition, not only in the French language, but even in the whole compass of ancient and modern literature. The irregularity of his method, however, renders it a very difficult task to give an abridged view of his work. He conducts his pupil, indeed, from infancy to manhood: But instead of being barely a system of education, his work is besides a treasure of moral and philosophical knowledge. He has chosen a path, and follows it from the bottom to the summit of the hill: yet whenever a flower appears on the right or left hand, he eagerly steps aside to pluck it; and sometimes, when he has once stepped aside, a new object catches his eye and seduces him still farther. Still, however, he returns. His observations are in many places loosely thrown together, and many things are introduced, the want of which would by no means have injured either the utility or the regularity of his work. If we attempt to review the principles on which he proceeds in repressing the prevalent modes of education, and pointing out a new course, his primary and leading one seems to be, that we ought to watch and second the observations which time and nature have placed under our eyes. He alludes to the sudden and accidental, and the gradual and progressive, to the sudden and accidental, and the gradual and progressive, to the sudden and accidental, and the gradual and progressive, to the sudden and accidental, and the gradual and progressive. It would be impossible to communicate to the blind any just ideas of colours, or to the deaf of sounds; so it must be acknowledged, that we cannot possibly communicate ...
municate to children ideas which they have not faculties to comprehend. It they are, for a certain period of life, merely sensitive animals, it must be folly to treat them during that period as rational and moral beings. But is it a truth that they are, during any part of life, guided solely by instinct, and capable only of sensation? Or, how long is the duration of that period? Has nature unkindly left them to be, till the age of twelve, the prey of appetite and passion? So far are the facts of which we have had occasion to take notice, concerning the history of infancy and childhood, from leading to such a conclusion, that to us it appears undeniable that children begin to reason very soon after their entrance into life. When the material world first opens on their senses, they are ignorant of the qualities and relations of surrounding objects: they know not, for instance, whether the candle which they inquire such ideas, without exerting reasoning powers in it may attract the notice and gain the applause of those who are able to help them; and that they attain not full strength in the powers either of mind or body, nor a sufficient acquaintance with nature, with artificial language, and with the arts and institutions of society, till they arrive at manhood.

Even Rousseau, notwithstanding the art with which he lays down his system, cannot avoid acknowledging indirectly, on several occasions, that our social dispositions, our rational and our moral powers, display themselves at an earlier period than that at which he wishes us to begin the cultivation of them.

But though the great outlines of his system be merely theory, unsupported by facts, nay plainly contradictory to facts; yet his observations on the impropriety or absurdity of the prevalent modes of education are almost always just, and many of the particular directions which he gives for the conduct of education are very judicious. He is often fanciful, and often deviates from the common road, only to show that he is able to walk in a separate path. Yet why should he be opposed with so much virulence, or branded with so many reproachful epithets? His views are liberal and extensive: his heart seems to have glowed with benevolence: his book contains much observation of human actions; displays an intimate acquaintance with the motives which sway the human heart; and if not a perfect system for education, is yet superior to what any other writers had before done upon the subject. It is surely true, that we ourselves often call forth evil passions in the breasts of children, and impress them with bad habits: it is no less true that we put books in their hands, and load their memory with words, when we ought rather to direct their attention to things, to the phenomena of nature, and the simplest arts of life. The form in which he has chosen to communicate his sentiments on the subject of education renders the perusal of it more pleasing, and his precepts more plain, than they would otherwise have been: it is nearly that dramatic form with which we are so much delighted in some of the noblest compositions of the ancients.

After viewing the public establishments for education which existed in some of the most renowned states of antiquity; and after listening to the sentiments of the experienced Quintillian, the learned Milton, the judicious Locke, and the bold fanciful Rousseau, on this interesting subject; it may now be proper to lay before the reader our own sentiments concerning the education of youth under a few distinct heads.

Indeed, if we were disposed to give abridgments of all the books which have been written on the subject of education, or even to hint at all the various modes which have been recommended by teachers or theorists, we might swell this article to an amazing size: nay, were we only to take notice of the many elegant and sensible writers who have of late endeavoured to call the attention of the public to this subject, we might extend it to an immoderate length. A Kames, a Priestley,
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mercurial employment, and for the other humbler occupations in active life not particularly connect-
ed with literature; education of the female sex; foreign travel; knowledge of the world; and entrance into active life. We do not pretend to be able to include under these heads every thing worthy of
notice in the subject of education: but under these we will be able to comprehend almost every thing of importance that has occurred to us on the subject.

I. On the Management of Infants from the Time of their Birth till they attain the Age of five or six.

The young of no other animal comes into the world in so helpless a state, or continues so long to need assistance, as that of the human species. The calf, the lamb, and the kid, are vigorous and lively at the instant of their birth; require only, for a very short period, nourishment and protection from their respective dams; and soon attain such degrees of strength and activity as to become entirely independent. The infancy of the oviparous animals is not of longer continuance: and, indeed, whatever department of the animal world we may choose to survey, we shall find that every species is subject to the same severer laws as man during the first period of life.

Yet the character and the views of man are so very different from those of the other animals, that a more careful attention to these may perhaps induce us to regard this seeming severity rather as an instance of the peculiar kindliness of the Author of nature. From every observation which has been hitherto made on the powers and operations of the inferior animals, we are led to consider them as guided and actuated chiefly, if not solely, by instinct, appetite, and sensation: their views extend not beyond the present moment; nor do they acquire new knowledge or prudence as they advance in life. But the character of the human race is much more exalted. We have also powers and organs of sensation, instincts and appetites; but these are the most ignoble parts of our nature: our rational faculties and moral powers elevate us above the brutes, and advance us to an alliance with superior beings. These rational faculties and moral powers render us capable of social life, of artificial language, of art, of science, and of religion. Now, were one of the species to come into the world fully grown, possessed of that bodily strength and vigor which distinguishes manhood, his ignorance Education would still render him inadequate to the duties of life; nay, would render him unable to procure means for his subsistence: while his manly appearance would deprive him of the compassion and benevolent affiance of others; and his strength and vigor would also render him less docile and obedient than is necessary, in order that he may receive instruction in the duties and arts of life. Again, were the period of infancy as short to the human species as to the other animals; were we to be no longer subjected to a parent's authority, or protected by his care, than the bird or the quadruped; we should be exposed to the dangers and difficulties of the world before we had acquired sufficient knowledge or prudence to conduct us through them, before we had gained any acquaintance with the ordinary phenomena of nature, or were able to use the language or practice the arts of men in a social state.

Since, then, it is by the benevolence of nature that we are feeble and helpless at our entrance into life, and that our progress towards maturity is slow and gradual; since nature has destined us to be for a considerable time under the care and authority of our parents; and since the manner in which we are managed during that early part of life has so important an influence on our future character and conduct: it is therefore incumbent on parents to direct that tenderness, which they naturally feel for their offspring, in such a manner as to second the views of nature.

When children come into the world, instinct directs them to receive nourishment from the breast, and to claim attention to their pains and wants by crying. We attend to their signs, and strive to render them as Draught of intents as easy as we can. They are washed, clothed with such garments as we think most suitable, and suckled either by their mother or by some other woman who is considered as proper for the purpose. The abrupt mode of swaddling up infants in such a manner as to confine them almost from all motion, and leave a limb at liberty, which has been so often exclaimed against and represented as highly injurious to the symmetry and vigour of the human frame, is now almost entirely laid aside; and therefore we now consider it against it. Still, however, there are certainly too many palls and bandages used in the dress of infants: these are unfavourable to the circulation of the blood, impede the growth, and often occasion those tears and that perverseness which we rashly attribute to the natural ill-humour of the poor creatures. Their dress ought to be loose and cool, so as to press hard on no joint, no vein nor muscle; and to leave every limb at liberty. If too heavy and close, it may occasion too copious perspiration, and at the same time confine the matter periptr on the surface of the skin; than which nothing can be more prejudicial to the health of the child. It may also, however, be too thin and cool: for as moderate warmth is necessary to the vegetation of the body, it is no less necessary for promoting the growth of animals: and, therefore, though the dress of infants ought to be loose and easy, yet still it should be moderately warm.

It is common for mothers in affluent or even in comfortable circumstances, to forgo the pleasure of nursing their own children, that they may avoid the fatigue with which it is attended. This practice has long prevailed in various ages and among various nations:
mild or passionate; and which, though they be generally attributed to the original conformation of the mind by the hand of nature, yet are owing rather to the circumstances in which we are placed, and the manner in which we are treated, during the first part of life.

When children begin to walk, our fondness disposes us to adopt many expedients to assist them. But these seem to be improper. It is enough for us to watch over them so as to guard them from any danger which they might otherwise incur by their first attempts to move about. Those who advise us not to be too anxious to preserve children from those falls which are exposed from their disposition to activity, before they have acquired sufficient strength or caution, certainly give a judicious piece of advice which ought to be listened to. By being too attentive to them, we teach them to be careless of themselves; by seeming to regard every little accident which befalls them as a most dreadful calamity, we inspire them with timidity, and prevent them from acquiring many fortitude. When children begin to slip out a few words or syllables, the pleasure which we feel at hearing them aim at the use of our language, disposes us to listen to them with such attention as to relieve them from the necessity of learning an open distinct articulation. Thus we teach them to express themselves in a rapid, indistinct, and hesitating manner, which we often find it difficult, sometimes even impossible to correct, when they are farther advanced. Would we teach them a plain distinct articulation, we ought not only to speak plainly and distinctly in their presence, but also to disregard their questions and requests, if not expressed with all the openness and distinctness of pronunciation of which they are capable.

Man is naturally an imitative animal. Scarce any of our natural dispositions is displayed at an earlier period than our disposition to imitation. Children's first amusements are dramatic performances, imitative of the arts and actions of men. This is one proof among others, that even in infancy our reasoning faculties begin to display themselves; for we cannot agree with some philosophers, that children are actuated and guided solely by instinct in their attempts at imitation.

However that be, the happiest use might be made of this principle which discovers itself so early in the infant mind. Whatever you wish the child to acquire, do in his presence in such a manner as to tempt him to imitate you. Thus, without forcing his mind by restraint during this gay innocent period of life, you may begin even now to cultivate his natural powers. Were it impossible at this time to communicate any instruction to the boy, without bannishing that frightful gaiety which naturally distinguishes this happy age, it would be best to think only how he might lose his time in the least disadvantageous manner. But this is far from being necessary. Even now the little creature is disposed to imitation, is capable of emulation, and feels a desire to please those whose kindnesses has gained his affection. Even now his sentiments and conduct may be influenced by rewards when prudently bestowed, and by punishments when judiciously inflicted. Why then should we hesitate to govern him by
Such are the thoughts which have suggested themselves to us concerning the management of children in mere infancy. What an amiable little creature would the boy or girl be, who were brought up in a manner not inconsistent with the spirit of these few hints? Behold him healthy and vigorous, mild, sprightly, and cheerful: He is submissive and docile, yet not dull or timid; he appears capable of love, of pity, and of gratitude. His mind is hitherto, however, almost wholly uninformed; he is acquainted but with a few of the objects around him; and knows but little of the language, manners, and institutions of men: but he feels the impulse of an ardent curiosity, and all the powers of his mind are alive and active.

II. On the Management of Children between the Age of five or six and the Age of puberty.

At this period it may be proper, not only to exact obedience, and to call the child's attention for a few minutes now and then to those things of which the knowledge is likely to be afterwards useful to him; but we may now venture to require of him a regular steady application, during a certain portion of his time, to such things as we wish him to learn. Before this time it would have been wrong to confine his attention to any particular task. The attempt could have produced no other effect than to destroy his natural gaiety and cheerfulness, to blunt the native quickness of his powers of apprehension, and to render hateful that which you wished him to acquire. Now, however, the case is somewhat different: The child is not yet sensible of the advantages which he may derive from learning to read, for instance; or even though he were able to foresee all the advantages which he will obtain by skill in the art of reading through the course of life, yet it is the character of human nature, at every stage of life, to be so much influenced by present objects in preference to future views, that the feene of its utility alone would not be sufficient to induce him to apply to it. Even at the age of 12, 15, 20, of 30; nay, in extreme old age, when reason becomes very perceptive, and the passions are mortified; still we are unable to regulate our conduct solely by views of utility. Nothing could be more absurd, therefore, than to permit the child to spend his time in foolish tricks, or in idleness, till views of utility should prompt him to spend it in a different manner. No; let us begin early to habituate him to application and to the industrious exertion of his powers. By endowing him with powers of activity and apprehension, and rendering him capable of pursuing with a steady eye those objects which attract his desires, nature plainly points out to us in what manner we ought to cultivate his earlier years. Besides, he can command his obedience, we can awaken his curiosity, we can rouse his emulation, we can gain his affection, we can call forth his natural disposition to imitation, and we can influence his mind by the hope of reward and the fear of punishment. When we have so many means of establishing our authority over the mind of the boy without tyranny or coarseness; it cannot surely be difficult, if we are capable of any moderation and prudence, to cultivate his powers by making him begin at this period to give regular application to something that may afterwards be useful.

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And if the boy must now begin to dedicate some portion of his time regularly to a certain task, what task will be most suitable? Even that for which children are usually required to apply and continue teaching him to read. Be not afraid that his abilities will suffer from an attention to books at so early an age. Say not that it is folly to teach him words before he has gained a knowledge of things. It is necessary, it is the design of nature, that he should be employed in acquiring a knowledge of things, and gaining an acquaintance with the vocal and written signs by which we denote them, at the same time. These are intimately connected; the one leads to the other. When you view any object, you attempt to give it a name, or seek to learn the name by which men have agreed to distinguish it; in the same manner, when the names of substances or of qualities are communicated to us, we are desirous of knowing what they signify. At the same time, if imperfect is the knowledge of nature which children can acquire from their own unassisted observation, that they must have frequent recourse to our assistance before they can form any distinct notions of those objects and scenes which they behold. Indeed language cannot be taught, without teaching that it is merely a system of signs, and explaining what each particular sign is designed to signify. If, therefore, language is not only necessary for facilitating the mutual intercourse of men, but is even useful for enabling us to obtain some knowledge of external nature, and if the knowledge of language has a natural tendency to advance our knowledge of things; to acquaint ourselves with it must therefore be regarded as an object of the highest importance: it must also be regarded as one of the first objects to which we ought to direct the attention of children. But the very same reasons which prove the propriety of making children acquainted with those artificial vocal signs which we use to express our ideas of things, prove also the propriety of teaching them those other signs by which we express these in writing. It is possible indeed, may it frequently happens, that we attempt to instruct children in language in so improper a manner as to confound their notions of things, and to prevent their intellectual powers from making that improvement of which they are naturally capable; but it is also possible to initiate them in the art of reading, and in the knowledge of language, with better success and happier effects. The knowledge of language may be considered as the key by which we obtain access to all the stores of natural and moral knowledge.

Though we now agree to confine our pupil to a certain task, and have determined that his first task shall be to learn to read; yet we do not mean to require that he be confined to this task during the greatest part of the day, or that his attention be seriously directed to no other object. To subject him to too severe restraint would produce the most unfavourable effects on his genius, his temper, and his dispositions. It is in consequence of the injudicious management of children, while they are sometimes suffered to run riot, and at other times cruelly confined like prisoners or slaves; it is in consequence of this, that we behold so many instances of peevishness, caprice, and invincible aversion to all serious application at this period of life. But were a due medium observed, were restraint duly tempered with liberty and indulgence, nothing would be more easy than to dispose children to cheerful obedience, and to communicate to them instruction at this age. That part of their time which they are left to enjoy at liberty, they naturally dedicate to their little sports. The favourite sports of boys are generally active; those of girls, sedentary. Of each we may take advantage, to prepare them for the future employments of life. However, neither are the amusements of boys invariably active, nor those of girls always sedentary; for, as yet, the manners and dispositions of the two sexes are distinguished rather by habit or accident than by nature. The disposition to activity which characterizes children, is no less favourable to health than to their improvement in knowledge and prudence; their active sports have a tendency to promote their growth and add new vigour to their limbs. Perhaps, even at this time, children might be enticed to learn the elements of natural philosophy and natural history amid their amusements and sports. Birds, butterflies, dogs, and other animals, are now favourite objects of their care; their curiosity is powerfully roused by the appearance of any strange object; and many of the simplest experiments of natural philosophy are so pleasing, that they cannot fail to attract the attention even of those who are least under the influence of curiosity. Yet it would be improper to insist on their attention to these things as a task; if we can make them regard them as amusements, it will be well; if not, we must defer them to some happier season. They might also, by proper management, be led to acquire some skill in the arts. They build mimic houses, and fill them with suitable furniture; they construct little boats, and sail them; they will fence in little gardens, and cultivate them; and we even see them imitate all the labours of the husbandman. Such is the pleasure which man naturally feels in exerting his powers, and in acted with delight. Let us encourage this disposition. These are the most suitable amusements in which they can engage.

As the boy's attention to literary objects is still fostered to be continued, he will soon be able to read books more easily, and with some correctness and facility. It becomes an end in itself an object of importance, and of no small difficulty, to determine what books are to be put into his hands, and in what manner his literary education is to be conducted. After the child is made acquainted with the names and powers of the letters, with their combination into syllables, and with the combination of these again into words, so that he can read with tolerable facility; it will be proper that the pieces of reading which are put into his hands be such as are descriptive of the actions of men, of the scenes of external nature, and of the forms and characters of animals. With these he is already in some degree acquainted; these are the objects of his daily attention; beyond them the range of his ideas does not yet extend; and therefore other subjects will be likely to render his task disagreeable to him. Besides, our present object is to teach him words; in order to teach him words, we must let him know their signification; but till he has acquired a very considerable knowledge of language, till he has gained a rich fund of simple ideas, it will be impossible for him to read or to hear with understanding on any other subject but these. And let us not as yet be particularly
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**Education.**

...ticularly anxious to communicate to him religious or moral instruction, otherwise than by our example, and by causing him to act in such a manner as we think most proper. Our great business at present is, to make him acquainted with our language, and to teach him in what manner we use it to express our ideas. By his own observation, and by our instruction, he will soon become capable of comprehending all that we wish to communicate: But let us not be too hasty; the boy cannot long view the actions of mankind, and observe the economy of the animal and the vegetable world, without becoming capable of receiving both religious and moral instruction when judiciously communicated.

As soon as the pupil can read and spell with tolerable facility, and has acquired sufficient strength of arm and fingers to hold a pen, it may be proper to initiate him in the art of writing. If this art is not made disagreeable by the manner in which his application to it is required, he will learn it without difficulty. Childrens natural disposition to imitate, whatever depends on manual operation, renders this art peculiarly easy and pleasing to them when they are not harshly forced to apply to it, nor suffered to get into a habit of performing their task with haste and negligence.

It requires indeed the most cautious prudence, the nicest delicacy, and the most artful address, to prevail with children to give a cheerful and attentive application to any appointed task. If you are too stern and rigid in enforcing application, you may seemingly obtain your object: the child suits motionless, and fixes his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude.

**Restraint.**

...It requires indeed the most cautious prudence, the nicest delicacy, and the most artful address, to prevail with children to give a cheerful and attentive application to any appointed task. If you are too stern and rigid in enforcing application, you may seemingly obtain your object: the child suits motionless, and fixes his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude his eye on his book or copy; but his attention you cannot command; his mind is beyond your reach, and can elude.

**Gentleness.**

...Again, gentleness, and the arts of instruction, will not always be successful. If you permit the child to apply just as he pleases: if you listen readily to all his pretences and excuses: in short, if you seem to consider learning as a matter not of the highest importance, and treat him with kindnes while he pays but little attention and makes but slow progress; the consequences of your behaving to him in this manner will be worse faravable than those which attend imprudent and unreasonable severity. It is, however, farce possible to give particular directions how to treat children so as to allure them to learning, and at the same time to command their serious attention. But the prudent and affectionate parent and the judicious tutor will not be always unsuccessful; since there are so many circumstances in the condition of children, and so many principles in their nature, which subject them to our will.

The principles of arithmetic ought to make a part in the boys education as soon as his reasoning powers appear to have attained such strength and quickness that he will be able to comprehend them. Arithmetic affords more exercise to the reasoning powers of the mind than any other of those branches of learning Education, to which we apply in our earlier years; and if the child's attention be directed to it at a proper period, if he be allowed to proceed slowly, and if care be taken to make him comprehend fully the principles upon which each particular operation proceeds, it will contribute much to increase the strength and the acuteness of the powers of his understanding.

Where the learned languages are regarded as an object worthy of attention, the boy is generally initiated in them about this time, or perhaps earlier. We have referred to a separate head the arguments which occur to us for and against the practice of instructing children in the dead languages; and shall therefore only observe in this place, that the study of them ought not to engross the learners attention to entirely as to exclude other parts of education.

From arithmetic our pupil may proceed to the practical branches of the mathematics: And in all of these, as well as in every other branch of learning, what you teach him will be better remembered and most useful, if you afford him a few opportunities of applying his lessons to real use in life. Geometry and geography are two most important branches of education; but are often taught in such a manner, that no real benefit is derived from the knowledge of them. The means which Rousseau proposes for initiating young people in these and in several other of the arts and sciences are excellent; and if judiciously applied, could hardly fail of success.

While boys are engaged in these and in the languages, they may also attend to and cultivate the bodily exercises; such as dancing, fencing, and horsemanship. Each of these exercises is almost absolutely necessary for one who is designed to have intercourse with the world; and besides, they have a tendency to render the powers of the body active and vigorous, and even to add new courage and firmness to the mind.

When our pupil has acquired some knowledge of his own and of the learned languages, has gained some skill in the principles of arithmetic and of practical mathematics, and has received some instruction in the principles of morality and religion, or even before this time, it will be proper to begin him to the composition of composition. Themes, versified, and let ters, the first exercises in composition which the boy is usually required to perform, none of them seems appal for calculating for leading him to increase his knowledge, or to acquire the power of expressing himself with ease and elegance. Without enlarging on the impropriety or absurdity of these exercises, we will venture to propose something different, which we cannot help thinking would conduct more effectually to the end in view. It has been already observed, that the curiosity of children is remarkably eager and active, and that every new object powerfully attracts their regard: but they cannot view any object without taking notice of its most obvious qualities: any animal, for instance, without taking notice of its shape, its colour, its seeming mildness or ferocity; and they are generally ready to give an account of any thing extraordinary which they have observed. How easy then would it be to require them to write down an account of any new object exposed to their observation?
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Education. The task would not be difficult; and every new piece of composition which they presented to us would add fuel to their knowledge of nature. We might even require such specimens of their accuracy of observation and skill in language, at times when they enjoyed no opportunities of beholding new or surprising objects; a tree, a flower, a field, a house, an animal, any other simple objects, should be the subject of their exercise. After some time, we might require them to describe something more various and complex. They might give an account of several objects placed in a relative situation; as, a stream, and the vale through which it flows; or, a bird, and the manner in which it contructs its nest; or, of one object successively assuming various appearances, as the bud, the flower, the apple. Human actions are daily exposed to their observation, and powerfully attract their attention. By and by, therefore, their task should be to describe some action which had lately passed in their presence.

We need not pursue this hint farther; but, if we mistake not, by these means young people might sooner, and much more certainly, be taught to express themselves with ease and correctness in writing, than by any of the exercises which they are at present caufed to perform with a view to that. Besides, they would at the same time acquire much more real knowledge. The study of words would then be rendered truly subservient to their acquiring a knowledge of things.

We cannot commend to every particular of that series of education in which we wish the boy to be engaged from that period when he first becomes capable of serious application till he reach the age of puberty. It is not necessary that we should, after having given abstracts of what has been offered to the world by so many respectable writers on the subject.

The few hints which we have thrown out will be sufficient to shew, in general, in what manner we wish the youth's education to be conducted during this period. Let the parent and the tutor, bear in mind, that much depends on their example, with regard to the dispositions and manners of the youth; and let them carefully strive to form him to gentleness, to firmness, to patient industry, and to vigorous courage: let them, if possible, keep him at a distance from that contagion with which the evil example of worthless servants and play-fellows will be likely to infect him. Now is the time for fowing the seeds of piety and virtue: if carefully sown now, they will scarce fail to grow up, and bear fruit in future life.

III. From Puberty to Manhood.

This age is every way a very important period in human life. Whether we consider the change which now takes place in the bodily constitution, or the passion which now first begins to agitate the breast, still we must regard this as a critical season to the youth. The busines of those to whose care he is still entrusted, is to watch over him so as to prevent the passion for the sex from hurry him to shamefule and vicious indulgence, and from reducing him to habits of frivolity and indolence; to prevent him from becoming either the flamelike rake, or the trifling coxcomb, Though so furious is the impulse of that appetite which now fires the bosom and shoots through the veins of the youth, that to restrain him from the excelsis to which it leads can be no easy task; yet if his education has been hitherto conducted with prudence, it is fond of many exercifes, active, sober, and temperate, and still influenced by modesty and the fentle of name; even this may through the blessing of heaven be accomplished. It is impossible to give better directions than those of Rousseau for this purpose. Let the young man know his situation; let him now, in a striking light the virtue which he may practice by restraining appetite, and the frightful fatal vices into which he may be hurried. But truly not to precept, nor to any views which you can lay before him, either of the ingratitude of and the pernicious consequences of vice, or of the dignity and the happy fruits of virtue. Something more must be done. Watch over him with the attention of an Argus; engage him in the most active and fatiguing sports. Carefully keep him at a distance from all such company, and such books, as may suggest to his mind ideas of love, and of the gratification at which it aims. But still all your precautions will not counteract the designs of nature; nor do you wish to oppose her designs. The youth under your care must feel the impulse of desire, and become fusceptible of love. Let him then fix his affections on some virtuous young woman. His attachment to her will raise him above debauchery, and teach him to despise brutal pleasures: it will operate as a motive to dispose him to apply to such arts, and to pursue such branches of knowledge, as may be necessary for his farther establishment in the world. The good sense of Rousseau on this head renders it less necessary for us to enlarge on it: especially as we are to treat of some articles separately which regard the management of youth at this period.

IV. Religion and Morals.

In pointing out the general plan of education which appears to us the most proper to be pursued in order to age the form a virtuous and respectable member of society, we took but slight notice of the important objects of religious and morals. At what period, and in what manner, ought the principles of religion and morality to be inculcated into the youthful mind? It has been before observed, that children are capable of reasoning and of moral distinctions even at a very early age. But they cannot then comprehend our reafonings, nor enter into our moral distinctions; because they are strangers to our language, and to the artificial manner in which we arrange our ideas when we express them in conversation or in writing. It follows, then, that as soon as they are sufficiently acquainted with our language, it must be proper to communicate to them the principles and precepts of morality and religion. Long before this time, they are diligent and accurate observers of human actions. For a short period it is merely the external act which they attend to and obsevre: soon, however, they penetrate farther; conscious themselves of reflection and volition, they regard us also as thinking beings; conscious of benevolent and of unfriendly dispositions, they regard us as acting with design, and as influenced by passion: naturally imitative animals, they are disposed in their conduct to follow the example which we set before them. By our example we may teach them piety and virtue long before it can be proper to offer them religious or moral instruction in a formal manner.
We cannot presume to determine at what particular period children ought to be first informed of their relations to God and to society, and of the duties incumbent on them in consequence of those relations. That period will be different to different children, according to the pains which have been taken, and the means which have been employed, in cultivating their natural powers. Perhaps even where the most judicious maxims of education have been adopted, and have been pursued with the happiest effects, it cannot be sooner than the age of eight or nine. But even before this period much may be done. Show the child your reverence for religion and virtue; talk in his presence, and in the plainest, simplest terms, though not directly to him, of the existence of God the creator, the preserver, and the governor of the world; speak of the constant dependence of every creature on the gracious care of that Being; mention with ardor the gratitude and obedience which we owe to him as our great parent and best benefactor; next, speak of the mutual relations of society; of the duties of children and parents, of masters and servants, of man to man. At length, when his mind is prepared by such discourses which have passed in his presence without being addressed to him, you may begin to explain to him in a direct manner the leading doctrines of religion. He will now be able to comprehend you, when you address him on that important subject: the truths which you communicate will make a powerful impression on his mind; an impression which neither the corruption and dilipation of the world, nor the force of appetite and passion, will ever be able to efface.

Some writers on this subject have asserted, that youth are incapable of any just ideas of religion till they attain a much more advanced age; and have insisted, that for this reason, no attempts should be made to communicate to them the articles of our creed in their earlier years. This doctrine, both from its novelty and from its pernicious tendency, has provoked the keenest opposition. It has, however, been opposed rather with censure than with acute censure. Its opponents seem to have generally allowed that children are incapable of reasoning and of moral sensations; but they have ascribed wonderful effects to habit. Enrich the memory of children, say they, with the maxims of morality, and with the doctrines of religion: teach them prayers, and call them to engage in all the ordinances of religion. What though they comprehend not the meaning of what they learn? What though they understand not for what purpose you bid them repeat their prayers, nor why you confine them on the Lord's day from their ordinary amusements? Their powers will at length ripen, and they will then see in what they have been employed, and derive the highest advantage from their infantile talks to which you confined them. You have formed them to habits which they will not be able to lay aside: after this they cannot but be religious at some period of life, even though you have infribed them with a disgust for the exercises of religion. Those good people have also talked of the principle of the association of ideas. As no manstands alone in society, say they; so no one idea exists in the mind single and unconnected with others: as you are connected with your parents, your children, your friends, your coun-

trymen; so the idea of a tree, for instance, is con-
We flatter ourselves, then, that our readers will readily agree with us, 1st. That the moral and reasoning powers of children begin to display themselves at a very early age, even in infancy. 2dly, That as soon as they have made themselves acquainted with the most obvious appearances of nature, and have gained a tolerable knowledge of our language, and our manner of arranging our ideas in reasoning, we may with the greatest propriety begin to instruct them in the principles of religion. 3dly, That the most careful and judicious observation is necessary to enable us to distinguish the period at which children become capable of receiving religious instruction; because, if we either attempt to communicate to them those important truths too early, or defer them till towards manhood, we may fail of accomplishing the great end which we have in view.

If we can be so fortunate as to choose the happiest season for sowing the first seeds of piety in the infant mind, our next care will be to sow them in a proper manner. We must anxiously endeavour to communicate the principles of religion and morality, so as they may be most easily comprehended by the understanding of the learner, and may make the deepest impression on his heart. It would be a matter of the greatest difficulty to give particular directions on this head. The discretion of the parent or tutor must here be his guide. We are afraid that some of the catechisms commonly taught are not very happily calculated to serve the purpose for which they are intended. Yet we do not wish that they should be neglected while nothing more proper is introduced in their room. In instructing children in the first principles of religion, we must beware of arraying piety in the gloomy garb, or painting her with the forbidding features, in which she has been represented by anchorites, monks, and puritans. No; let her assume a pleasing form, a cheerful dress, and an inviting manner. Deify the Deity as the affectionate parent, the benefactor, and though the impartial yet the merciful judge of mankind. Exhibit to them Jesus Christ, the generous friend and saviour of the povertied Adam, who, with such enchanting benevolence hath said, “Suffer little children to come unto me.” Repræsent to them his yoke as easy, and his burden as light. Instruct not on their falling long prayers or hearing tedious sermons. If possible, make the doctrines of religion to appear to them as glad tidings, and its duties as the most delightful of tasks.

V. The Languages.

Is the time usually spent in learning the languages usefully occupied? What advantages can our youth derive from an acquaintance with the languages and the learning of Greece and Rome? Would we listen to many of the fathers, the mothers, and the police tutors of the present age, they will persuade us, that the time which is dedicated to grammar-schools, and to Virgil, Cicero, Homer, and Democritus, is foolishly thrown away; and that no advantages can be gained from the study of classical learning. They, with their children and pupils to be not merely schooled in them, but with them acquire what may be useful and ornamental when they come to mingle with the world; and for this purpose, they think it much better to teach their young people to master our tongue, to dance, to fence, to appear in company with invincible assurance, and to dress in such a manner as may attract the attention of the ladies. Besides, the tenderfews and humanity of those people are amazing. They are shaken at the idea of the sufferings which boys undergo in the course of a classical education. The confinement, the stripes, the harsh language, the burdens laid on the memory, and the pain occasioned to the eyes, during the dreary period spent in acquiring a knowledge of Greek and Latin, affect them with horror when they think of them as inflicted on children. They therefore give the preference to a plan of education in which less intense application is required and less severity employed.

But, again, there are others who are no less warm in their eulogiums on a classical education, and no less for it, inudistrustful in recommending the study of Greek and Latin, than those who are eager in their endeavours to draw neglect on the polished languages of antiquity. With the second class, if an adept in Greek and Latin, you are a great and learned man; but without those languages, contemptible for ignorance. They think it impossible to inspire the youthful mind with generous or virtuous sentiments, to teach the boy wisdom, or to animate him with courage, without the assistance of the ancient philosophers, historians, and poets. Indeed their superstitial reverence for the ancient languages, and for those writers whose compositions have rendered Greece and Rome so illustrious, leads them to ascribe many other still more wonderful virtues to a classical education.

With which of these parties shall we join? or shall we mediate between them? Is it improper to call youth to the study of the languages? Is it impossible to communicate any useful knowledge without them? Or are they, though highly useful, yet not always indispensably necessary?

We have formerly taken notice of one circumstance Utility of in favor of a classical education, to which it may be classical proper to recall the attention of our readers. We observed, that the cultivation of classical learning has a favourable influence on the living languages. It has a tendency to preserve their purity from being debased, and their analogy from becoming irregular. In studying the dead languages, we find it necessary to pay more attention to the principles of grammar than in acquiring our mother-tongue. We learn our native language without attending much to its analogy and structure. Of the numbers who speak English, but few are skilled in the inflexions of its nouns and verbs, or able to distinguish between adverbs and conjunctions. Desirous only of making their meaning understood, they are not anxious about purity or correctness of speech. They reject not an expression which occurs to them, because it is barbarous or ungrammatical. As they grew up they learned to speak from their mothers, their nurses, and others about them; they were soon able to make known their wants, their wishes, and their observations.
very early period to a liberal education, dons, 

... if we would not disdain to take Horace, a Livy, a Xenophon, and a Menander, as Rome gradually corrupted, till the social tendency to corrupt our care, as having contributed so much to raise the value a learned learning was followed by many happy effects. No; they can communicate knowledge without requiring laborious study. They profess to allow their pupils to enjoy the sweets of idleness, and yet render them prodigies of learning. Are their magnificent promises ever fulfilled? Do they indeed cultivate the understandings of the young people intrusted to their care? They do not; their care is never once directed to this important object. To adorn them with showy and superficial qualities, is all that those gentlemen aim at. Hence, when their pupils come to enter the world and engage in the duties of active life, they appear destitute of every manly qualification. Though they have attained the age and grown up to the size of manhood, their understandings are still childish and feeble; they are capricious, unsteady, incapable of industry or fortitude, and unable to pursue any particular object with keen, unremitting perseverance. That long series of study and regular application, which is requisite in order to attain skill in the ancient languages, produces much happier effects on the youthful mind. The power of habit is universally felt and acknowledged. As he who is permitted to trifle away the earliest part of his life in idleness or in frivolous occupations, can scarce be expected to display any manly or vigorous qualities when he reaches a more mature age; so, on the contrary, he whose earlier days have been employed in exercising his memory and furnishing it with valuable treasures, in cultivating his judgment and reasoning powers, by calling the one to make frequent distinctions between various objects, and the other to deduce many inferences from the comparison of the various objects presented to the understanding, and also in strengthening and improving the faculties of intellectual powers by attending to human scions and characters, and distinguishing between them, as virtuous or vicious, as mean or glorious: he who has thus cultivated his powers may be naturally ex-
expected to distinguish himself when he comes to perform his part in active life, by prudence, activity, firmness, perseverance, and most of the other noble qualities which can adorn a human character. But in the course of a classical education, the powers of the mind receive this cultivation; and therefore these happy effects may be expected to follow from it. The repetitions which are required afford improving exercise to the memory, and store it with the most valuable treasures; the powers of the understanding are employed in observing the distinctions between words, in tracing words to the substantives and qualities in nature which they are used to represent; in comparing the words and idioms of different languages, and in tracing the laws of their analogy and construction; while our moral faculties are at the same time improved, by attending to the characters which are described, and the events and actions which are related, in those books which we are directed to peruse in order to acquire the ancient languages. We assert therefore, that the study of the ancient languages is particularly useful for improving and strengthening all the powers of the mind; and, by that means, for preparing us to act as part in life as a becoming man; and this our readers will readily agree with us in considering as a weighty argument in behalf of that plan of education.

But, if, after all classical learning is still to be given up, where shall we find the same treasures of moral wisdom, of elegance, and of useful historical knowledge, which the celebrated writers of Greece and Rome afforded? Will you content yourself with the modern writers of Italy, France, and England? Or will you deign to survey the beauties of Homer and Virgil through the medium of a translation? No surely; let us penetrate to those sources from which the modern writers have derived most of the excellencies which recommend them to our notice; let us disdain to be imposed upon by the whims or the ignorance of a translator.

Further, classical learning has long been cultivated among us; and both by the floods of knowledge which it has conveyed to the mind, and the habits which it has impressed, has contributed in no small degree to form many illustrious characters. In reviewing the annals of our country, we will scarce find an eminent politician, patriot, general, or philosopher, during the two last centuries, who did not spend his earlier years in the study of the classics.

Yet though we have mentioned these things in favour of classical literature, and were we to defend to minute particulars might enumerate many more facts and circumstances to recommend it; we mean not to argue that it is absolutely impossible to be a wife, a great, or a good man, unless you are skilled in Greek and Latin. Means may, no doubt, be adopted to inspire the young mind with virtuous dispositions, to call forth the powers of the youthful understanding, and to imprint habits of industry and vigorous perseverance, without having recourse to the discipline of a grammar school. But we cannot help thinking, for the reasons which we have stated to our readers, that a classical education is the most likely to produce these happy effects.

As we are afterwards to take particular notice of the course of education most suitable for those who are to occupy the humble stations in society, we shall not here inquire whether it is proper to introduce them to an acquaintance with the Greek and Latin classics.

VI. On the Education of People of Rank and Fortune.

Those whom the kindnefs of Providence has placed in an elevated station, and in affluent circumstances, People of rank.

so that they seem to be born rather to the enjoyment of wealth and honours than to act in any particular profession or employment, have notwithstanding a certain part assigned them to perform, and many important duties to fulfil. They are members of society, and enjoy the protection of the civil institutions of that society to which they belong; they must therefore contribute what they can to the support of those institutions. The labours of the industrious poor are necessary to supply them with the luxuries of life; and they must know how to distribute their wealth with prudence and generosity among the poor. They enjoy much leisure; and they ought to know how to employ their leisure hours in an innocent and agreeable manner. Besides, as their circumstances enable them to attract the regard and respect of those who are placed in inferior stations, and as the poor are ever ready to imitate the conduct of their superiors: it is necessary that they endeavour to adorn their wealth and honours by the most eminent virtues, in order that their example may have an happy influence on the manners of the community.

Their education ought therefore to be conducted with a view to these ends. After what we have urged in favour of a classical education, our readers will naturally presume that we regard it as highly proper for a man of fortune. The youth who is destined to the enjoyment of wealth and honours, cannot spend his How to earlier years more advantageously than in gaining an form the acquaintance with the elegant remains of antiquity. temper of The benefits to be derived from classical learning are peculiarly necessary to him. Care must be taken to The young preferve him from acquiring an haughty, fierce, imperious temper. The attention usually paid to the children of people of fortune, and the foolish fondness with which they are too often treated, have a direct tendency to inspire them with high notions of their own importance, and to render them puffed, overbearing and conceited. But if their temper acquire this bias even in childhood, what may be expected when they advance towards manhood, when their attention is likely to be oftener turned to the dignity and importance of that rank which they occupy, and to the pitiful humility of those beneath them? Why, they are likely to be so proud, inflent, refentful, and revengeful, as to render themselves disagreeable and hateful to all who know them; and besides, to be incapable of those delightful feelings which attend humane, benevolent, and mild dispositions. Let the man of fortune, therefore, as he is concerned for the future happiness and dignity of his child, be no less careful to prevent him from being treated in such a manner as to be inspired with haughtiness, caprice, and insouciance, than to prevent his mind from being foured by harsh and tyrannical usage.

The mainly exercises, as they are favourable to the health, the strength, and even the morals; so they are highly
industry and persevering firmness, by passing through a regular course of classical learning in a free school; let them play and converse with their equals, and not be permitted to form high ideas of their own importance, nor to domineer over servants or inferiors: Let them be carefully instructed in the principles of morality and religion: Let them be taught the manly exercises: Let them be carefully informed of the nature of the political constitution of their country, and of the extent of those civil and political rights which it secures to them and their fellow-citizens: Let them be called to trace the annals of mankind through the records of history; to mark the appearances and operations of nature, and to amuse themselves by pursuing these to their general causes. We say nothing of causing the young man of fortune to learn some mechanical art: We think skill in a mechanical art might now and then afford him an innocent and pleasing amusement; but we do not consider it as absolutely necessary, and therefore do not insist on his acquiring it. With those accomplishments we hope he might become a useful member of society, might adorn the rank and fortune to which he is born, and might find wealth and high station a bleffing, not a curse. It is peculiarly unfortunate for our age and country, that people of rank and fortune are not so studious that their children acquire these as the more superficial accomplishments.

VII. On the Education of People designed for a Mercantile Employment, and for the Humbler Occupations of Life not particularly connected with Literature.

Were modern literature in a less flourishing state, the English and French languages adorned with fewer eminent poetical, historical, and philosophical compositions; we might perhaps insist on it as necessary to give the boy, who is designed for a mercantile employment, a classical education. At present this does not appear absolutely necessary; yet we do not presume to forbid it as improper. Even the elegant or merchant will scarce find reason to repent his education being introduced to the acquaintance of Plato and Cicero. But still, if the circumstances of the parent, or any other just reason, should render it inconvenient to lend the young man who is intended for trade to a free school to study the ancient languages, means may be easily adopted to make up for his loss. Conclude him not to writing and accounts alone. Thefe, though particularly useful to the merchant, have no great power to restrain the force of evil passions, or to infpire the mind with generous and virtuous sentiments. Though you burden him not with Latin and Greek, yet strive to infpire him with a taste for useful knowledge and for elegant literature. Some of the purest and most elegant of our poets, the excellent periodical works which have appeared in our language, such as the Spectator, the Adventurer, the Mirror, and the compositions of the British historians, together with some of the best translations of the classics which we possess; these you may with great propriety put into his hands. They will teach him how to think and reason judiciously, and to express himself in conversation or in writing with correctness and elegance: they will refine and polish his manners, and raise him above low and gross pleasures. And as nothing who has any occasion to speak or write, ought to be entirely ignorant of the principles of grammar, you will therefore
Education, therefore be careful to instruct the young man who is
designed for a mercantile occupation in the grammar of
his mother-tongue.

Integrity.
A fixed regard to his engagements, and an honesty
which may prevent him from taking undue advantages or
exacting unreasonable profits, are the virtues which
a merchant is most frequently called to exercise; punctu-
ality and integrity are the duties most particularly
incumbent on the mercantile profession. Temptations
will now and then arise to seduce the merchant to the
violation of these. But if superior to every such tempta-
tion, he is one of the most illustrious characters, and
is likely to be one of the most successful merchants.
From his earliest years, then, labour to inspire the
child whom you intend for trade with a fixed regard
for truth and justice: let him be taught to view deceit
and fraud, and the violation of a promise, with abhor-
rence and disdain. Frugality is a virtue which, in the
present age, seems to be antiquated or proscribed. Even
the merchant often appears better skilled in the arts of
profusion than in those of parsimony. The miser, a chara-
ceter as usually viewed as amiable, is at present
held with double detestation and contempt. Yet, not-
withstanding these unfavourable circumstances, fear
not to impress on the young merchant habits of fruga-
ity. Let him know the folly of beginning to spend a
fortune before he has acquired it. Let him be taught
to regard a regular attention to confine his expences
within due bounds, as one of the first virtues which can
adorn his character.

Frugality and industry are so closely connected, that
when we recommend the one of them to the merchant,
we will be naturally understood to recommend the oth-
er also. It is easy to see, that, without industrious
application, no man can reasonably expect to meet with
success in the occupation in which he engages; and if
the merchant thinks proper to leave his business to the
management of clerks and shop-keepers, it is not very
probable that he will quickly accumulate a fortune. It
is, therefore, no less necessary, that he who is intended
for trade be early accustomed to habits of sober appli-
cation, and be carefully restrained from volatility and
levity, than that he be instructed in writing, arithmetic,
and keeping of accounts.

With these virtues and qualifications the merchant is
likely to be respectable, and not unsuccessful, while he
continues to prosecute his trade: and if, by the blest-
ning of Providence, he be at length enabled to accumu-
late a moderate fortune, his acquaintance with elegant
literature, and the virtuous habits which he has acquir-
ed, will enable him to enjoy it with taste and dignity.
Indeed all the advantages which a man without taste,
or knowledge, or virtue, can derive from the possession
of even the most splendid fortune, are so inconsiderable,
that they can be no adequate reward for the toil which
he undergoes, and the mean arts which he practises in
acquiring it. At the head of a great fortune a fool
can only make himself more ridiculous, and a man of
a wicked and vicious character more generally abhorred,
than if fortune had kindly concealed their crimes and
folies by placing them in a more obscure station.

Education of persons placed in such circumstances, that it is impossible for
them to receive the advantages of a liberal education.
The mechanic and the husbandman, who earn a subsist-
ence by their daily labour, can seldom afford, whatever
parental fondness may suggest, to favour their children
with many opportunities of literary instruction. Con-
tent if they can provide them with food and raiment
till such time as they acquire sufficient strength to la-
bour for their own support, parents in those humble cir-
cumstances seldom think it necessary that they should
concern themselves about giving their children learning.
Happily it is not requisite that those who are destined
to spend their days in this low sphere should be fur-
mithed with much much literary or scientific knowledge. They
may be taught to read their mother tongue, to write,
and to perform some of the most common and the most
generally useful operations of arithmetic: for without
an acquaintance with the art of reading, it will scarce be
possible for them to acquire any rational knowledge
of the doctrines and precepts of religion, or of the duties
of morality; the invaluable volume of the sacred
scriptures would be thrown to them: we may allow
them to write, in order that they may be enabled to
enjoy the sweet satisfaction of communicating accounts
of their welfare to their absent friends; and, besides,
both writing and arithmetic are necessary for the acco-
cmplice of those little transactions which pass am-
ong them. It would be hard, if even the lowest and
poorest were denied these simple and easily acquired
branches of education; and happily that degree of skill
in them which is necessary for the labourer and the me-
chanic may be attained without greater expense than
may be afforded by parents in the meanest circum-
cstances.

Let the youth who is born to pass his days in this
humble station be carefully taught to consider hon-
est patient industry as one of the first of virtues: let
him be taught to regard the flagrant as one of the most
contemptible of characters: teach him contentment
with his lot, by letting him know that wealth and hon-
our seldom confer superior happiness: yet scruple not
to inform him, that if he can raise himself above the
humble condition to which he was born, by honest arts,
by abilities virtuously exercised, he may find some com-
fort in affluent circumstances, and may find reason to
rejoice that he has been virtuous, industrious, and ac-
tive. In teaching him the principles of religion, be
careful to shew him religion as intimately connected
with morality: teach him none of those mysterious
doctrines, whose sole tendency is to foster that enthu-
siasm which naturally prevails among the vulgar, and
to persuade them that they may be pious without being
virtuous. Labour to inspire him with an invincible
abhorrence for lying, fraud, and theft. Inspire him
with an high esteem for chastity, and with an awful
regard to the duties of a son, an husband, and a father.
Thus may he become respectable and happy, even in his
humble station and indigent circumstances; a chara-
ceter infinitely superior, in the eyes of both God and
man, to the rich and great man who misemploys his
wealth and leisure in shameful and vicious pursuits.

VIII. On the Education of the Female Sex.

The abstracts which we have given of some of the most
celebrated and original treatises on education, as
well as our own observations on this subject, have been hi-
therto either relative to the education of both the sexes,
or directed chiefly to the education of the male sex.
But as there is a natural difference between the charac-
ters
Education.

Education.

of the two sexes, and as there are certain duties peculiar to each of them; it is easy to see that the education of the boy and that of the girl cannot, ought not, to be conducted precisely in the same manner. And since the duties of the female sex are so important to society, and they form so considerable a part of our species; their education, therefore, merits the highest attention.

In infancy, the instincts, the dispositions, and the faculties of boys and girls seem to be nearly the same. They discover the same curiosity, and the same disposition to activity. For a while they are fond of the same sports and amusements. But by and by, when we begin to make a distinction in their breasts; when the girl begins to more confined to a sedentary life under her mother's eye, while the boys are permitted to ramble about without doors; the distinction between their characters begins to be formed, and their taste and manners begin to become different. The boy now imitates the arts and the active amusements of his father; digs and plants a little garden, builds a house in miniature, shoots his bow, or draws his little cart; while the girl, with no less emulation, imitates her mother, knits, sews, and dresses her doll. They are no longer merely children: the one is now a girl; the other a boy. This taste for female arts, which the girl so easily and naturally acquires, has been judiciously taken notice of by Rousseau, as affording an happy opportunity for instructing her in a very considerable part of the art in which it is proper to teach her. While the girl is busied in adorning her doll, the industriously becomes expert at needle-work, and learns how to adjust her own dress in a becoming manner. And therefore, if he be kindly treated, it will not be a matter of difficulty to prevail with her to apply to these branches of female education. Her mother or governess, if capable of managing her with mildness and prudence, may teach her to read with great facility. For being already disposed to sedentary application than the boy of the same age, the confinement to which the girl is subtilt in order to learn, will be less irksome to her. So that when we preclude that the reasonings powers of girls begin to exert themselves sooner than those of boys. But, as we have already declared our opinion, that the reasoning powers of children of both sexes begin to display themselves at a very early period; so we do not believe that those of the one sex begin to appear, or attain maturity, sooner than those of the other. But the different occupations and amusements in which we cause them to engage from their earliest years, naturally call forth their powers in different manners, and perhaps enable the one to imitate our modes of speaking and behaviour sooner than the other. However, as we wish both boys and girls to learn the art of reading at a very early age, even as soon as they are capable of any serious application; so we wish girls to be taught the art of writing, arithmetic, and the principles of religion and morals, in the same order in which these are inculcated on boys.

We need not point out the reasons which induce us to regard these as accomplishments proper for the female sex: they seem to be generally considered as not only suitable, but necessary. It is our most important privilege, as beings placed in a situation different from that of the inferior animals, that we are capable of religious sentiments and religious knowledge; it therefore becomes us to communicate religious instruction with no less affability and care to the youth of the female sex than to those of our own. Besides, as the care of children during their earlier years belongs in a particular manner to the mother; she, therefore, whom nature has destined to the important duties of a mother, ought to be carefully prepared for the proper discharge of those duties, by being accurately instructed, in her youth, in such things as it will be afterwards requisite for her to teach her children.

Ladies have sometimes distinguished themselves as prodigies of learning. Many of the most eminent geniuses of the French nation have been of the female sex. Several of our countrywomen have also made a respectable figure in the republic of letters. Yet we cannot approve of giving girls a learned education, how far becoming in ladies.

To acquire the accomplishments which are more proper for their sex, will afford sufficient employment for their earlier years. If they be instructed in the grammar of their mother tongue, and taught to read and speak it with propriety: be taught to write a fair hand, and to perform with readiness the most useful operations of arithmetic: if they be instructed in the nature of the duties which they owe to God, to themselves, and to society; this will be almost all the literary instruction necessary for them. Yet we do not mean to forbid them an acquaintance with the literature of their country. The periodical writers, who have taught that the duties of morality, the decencies of life, and the principles of taste, in so elegant and pleasing a manner, may with great propriety be put into the hands of our female pupil. Neither will we deny her the histories, the most popular voyages and travels, and such of the British poets as may be put into her hands without corrupting her heart or inflaming her passions. But could our opinion or advice have so much influence, we would endeavour to persuade our countrywomen and countrywomen to banish from among them the novelists, those panders of vice, with no less determined severity than that which Plato excludes the poets from his republic, or that which converted to Christianity, mentioned in the Acts, condemned their apocryphal volumes to the flames. Unhappily, novels and plays are almost the only species of reading in which the young people of the present age take delight; and nothing has contributed more effectually to bring on that dissoluteness of manners which prevails among all ranks.

But we will not discover so much austeritv as to express a wish that the education of the female sex should be confined solely to such things as are plain and useful. We forbid not those accomplishments which are merely ornamental, and the design of which is to add to the charm of our female sex. When we consider the duties for which they are destined by nature, we find that the art of pleasing constitutes no inconsiderable part of these; and it would be wrong not therefore, to deny them those arts, the end of which is to enable them to please. Let them endeavour to acquire taste in drefs: to drefs in a near graceful manner, to suit colours to her complexion, and the figure of her clothes to her shape, is no small accomplishment for a young woman. She who is rigged out by the taste and dexterity of her maid and her milliner, is nothing better than a doll.
Such are the hints which have occurred to us on the Education proper for the female sex, as far as it ought to be conducted in a manner different from that of the male.

IX. Public and private Education.

One question usually discussed by the writers on this subject has not hitherto engaged our attention. It is, whether it be most proper to educate a young man privately, or send him to receive his education at a public school? This question has been so often agitated, and by people enjoying opportunities of receiving all the information which experience can furnish on the subject, that we cannot be expected to advance any new argument of importance on either side. Yet we may state what has been urged both on the one and the other.

They who have considered children as receiving their education in the house and under the eye of their parents, and as included in a great measure from the society of other children, have been sometimes led to consider this situation as particularly favorable for their acquiring useful knowledge, and being formed to virtuous habits. Though we reap many advantages from mingling in social life, yet in society we are also tainted with many vices to which he who lives in solitary retirement is a stranger. At whatever period of life we begin to mix with the world, we shall find that we have not yet acquired sufficient strength to resist those temptations to vice which we are there affailed. But if we are thus ready to be infected with the contagion of vice, even at any age, no other argument can be necessary to show the propriety of confining children from those dangerous scenes in which this infection is so easily caught. And whoever surveys the state of morals in a public school with careful and candid attention, even though it be under the management of the most virtuous, judicious, and amicable masters, will find reason to acknowledge, that the empire of vice is established there not less fully than in the great world. Nothing, therefore, can be more negligent or inhuman, than for parents to expose their children to those seductions which a great school presents, at a time when they are strongly disposed to imitate any example let before them, and have not yet learned to distinguish between such examples as are worthy of imitation, and those which ought to be beheld with abhorrence. Even when under the parent's eye, from intercourse with servants and visitors their native innocence is likely to suffer considerably. Yet the parent's care will be much more likely to preserve the manners of his child uncorrupted in his own house, than any affiduity and watchfulness of his teachers in a school.

The morals and dispositions of a child ought to be the first objects of our concern in conducting his education; but to initiate him in the principles of useful knowledge is also an important object; and it will be happy, if in a private education virtue be not only better secured, but knowledge also more readily acquired, than in a public. But this actually happens. When one or two boys are committed to the care of a judicious tutor, he can watch the most favorable seasons for communicating instruction; he can awake curiosity and command attention by the gentle arts of instruction: though he strive not to inflame their breasts with emulation, which leads often to envy and inverte-
and performs the duties incumbent upon her; so the education of a boy who is banished from his parent’s house at a time when he has scarce begun to know the relation in which he stands to his father and mother, brothers or sisters, soon ceases to regard them with that fondness which he had contracted for them from living in their company and receiving their good offices. His resources of affection, and his kindness, are bestowed on new objects, perhaps on his master or his companions; or else his heart becomes selfish and delineate of every tender and generous feeling; and when the gentle and amiable affections of filial and fraternal love are thus, as it were, torn up by the roots, every evil passion springs up, with a rapid growth, to supply their place. The boy returns afterwards to his father’s house, but he returns as a stranger; he is no longer capable of regarding his parents and relations with the same tenderness of affection. He is now a stranger to that filial love which springs up in the breast of the child who is constantly inhabiting the tender care of his parents, and spends his earlier years under their roof, in such a manner as to appear the effect of instinct rather than of habit. Selfish views are now the only bond which attaches him to his parents and relations; and by coming under their influence at so early a period of life, he is rendered for ever incapable of all the most amiable virtues which can adorn human nature. Let the parent, therefore, who loves his child, and wishes to obtain from him a mutual return of affection, beware of excluding him from his house, and devolving the sole charge of him upon another, in his childhood.

These views represent a private education as the most favourable to virtue, to knowledge, and to the mutual affection which ought always to unite the parent and his child. But let us now listen to the arguments which are usually urged in behalf of a public education.

In the first place it has been affirmed, that a public Arguments education is much more favorable as a than a private to the pupil’s improvement in knowledge, and much more likely to inspire him with an ardour for learning. In a private education, with whatever fidelity and tenderness you labour to render learning agreeable to your pupil, still it will be but an irksome task. You may confine him to his books but for a very short space in the course of the day, and allow him an alternation of study and recreation. Still, however, you will never be able to render his books the favourite objects of his attention. He will apply to them with reluctance and careless indifference; even while he seems engrossed on his lesson, his mind will be otherwise occupied; it will wander to the scenes where he pursues his diversions, and to those objects which have attracted his desires. If the period during which you require his application be extremely short; during the first part of it, he will still be thinking of the amusements from which you have called him, and regretting his confinement during the last, he will fondly anticipate the moment when he is to be set at liberty, and think of new amusements. Again, if you confine him during a longer period, still more unfavourable effects will follow. Pleasures, dulness, and a determined aversion to all that bears the name of literature, will
Education be naturally impressed on his mind by such treatment. How can it be otherwise? Books pose as to few of the spirits which require the attention of children, that they cannot be naturally agreeable. They have nothing to attract and detain the eye, the ear, or any of the senses: they present things with which children are unacquainted, and of which they know not the value: children cannot look beyond the letters and words, to the things which these represent; and even though they could, yet is it much more pleasing to view scenes and objects as they exist originally in nature, than to trace their images in a faint and imperfect representation. It is vain, therefore, to hope that children will be prevailed with to pay attention to books by means of any allurements which books can of themselves present. Other means must be used; but those in a private education you cannot command. In a public seminary, the situation of masters with respect to their pupils is widely different. When a number of boys meet together in the same school, each of them soon begins to feel the impulse of a principle which enables the master to command their attention without difficulty, and prompts them to apply with cheerful ardour to tasks which would otherwise be extremely irksome. This principle is a generous emulation, which animates the breath with the desire of superior excellence, without inspiring envy or hatred of a competitor. When children are prudently managed in a great school, it is impossible for them not to feel this impulse. It is the same in the country school, or from some other circumstances, rather than from their being sent for their education to a public school. Again, at a public school young people enjoy much greater advantages for preparing them to enter the world, than they can possibly be favoured with if brought up in a private and solitary manner. A great school is a miniature representation of the world at large. The objects which engage the attention of boys at a school are different from those which occupy their parents; the views of the boys are less extensive, and they are not yet capable of protracting them by so many base and mean arts; but, in other respects, the two scenes and the actors appear to them nearly resemble each other; on both, you behold contending passions, opposite interests, weaknesses, cunning, folly, and vice. He therefore who has performed his part on the miniature scene, has rehearsed it were for the greater; if he has acquired himself well on the one, he may also be expected to distinguish himself on the other; and even he who has not distinguished himself at school, at least enters the world with superior advantages when viewed in comparison with him who has spent his earlier days in the ignorance and solitude of a private and domestic education. Besides, when a number of boys meet at a public seminary of education, separated from their parents and relations; nearly of the same age, engaged in the same studies, and fond of the same amusements: they naturally contract friendships with one another which are more cordial and sincere than any that take place between persons farther advanced in life. A friendship is often formed between two boys at school which continues through life, and is productive of the happiest consequences to each of them. While at school, they mutually assist and encourage each other in their learning; and their mutual affection renders their tasks less burdensome.
nations which they could not find in their native coun-
try. In the course of their travels, they heard the lec-
tures of celebrated philosophers; consulted the pri-
est, who were the guardians of the traditions of antiquity,
concerning the nature and origin of those traditions;
and observed the institutions of those nations which
were most renowned for the willow of their legisla-
ture. When they set out to visit foreign countries,
they seem to have proposed to themselves a certain
end; and by keeping that end steadily in view during
the course of their travels, they gained such im-
provement as to be able on their return to command
the veneration of their countrymen by means of the know-
ledge which they were enabled to communicate. Many
besides the philosophers of ancient Greece have trav-
elled for improvement, and have succeeded in their
views. But ancient history does not relate to us, that
travelling was considered by the Greeks or Romans as
necessary to finish the education of their young men
of fortune before they entered the scenes of active
life. It is true, after Greece became a province of the Ro-
man empire, and the Romans began to adopt the
science and elegance of Greece, and to cultivate Gre-
cian literature, the young noblemen of Rome often
repaired to Rhodes and Athens to complete their stu-
dies under the masters of philosophy and eloquence
who taught in those cities. But they went thither
with the same views with which our youth in modern
times are sent to free schools and universities, not to
acquire knowledge by the observation of nature, of
the institutions, manners, and customs of nations; but mere-
ly to hear lectures, read books, and perform exercises.
In modern times, a few men of reflection and expe-
rience have now and then travelled for improvement:
but the greatest part of our travellers, for a long time,
were enthusiastic devotees who went in pilgrimage
to visit the shrines or relics of some favourite saint;
soldiers, who wandered over the earth to destroy its in-
habitants; or merchants, whose business as factors be-
 tween widely distant countries and nations led them to
brave every danger in traversing from one corner of the
globe to another. But since the nations of modern
Europe have begun to emerge from rudeness, igno-
rance, and servile depression, they have formed one
great commonwealth, the members of which are fears-
less intimately connected with each other than were
the states of ancient Greece. The confluence of this
mutual connection and dependence is, the almost
all the nations of Europe have frequent intercourse
with one another; and as some of them are and have long
been more enlightened and refined than others, those na-
tions who have attained the highest degrees of civiliza-
tion and refinement have naturally attracted the admira-
tion and homage of the rest. Their language has been
flourished, their manners and arts have been adopted, and
even their drees has been imitated. Other nations have
thronged to pay the homage due to their superior
merit, and to study under them as masters. Hence
has arisen the practice which at present prevails among
us of sending our youth to complete their education
by travelling, before we introduce them to active
life, or require them to engage in business. Formerly
young men were not sent to travel till after they had proceed-
ed through the forms of a regular education, and had
at least attained such an age that they were no longer.
Education to be considered as mere boys. But the progress of
luxury, the desire of parents to introduce their children into the world at an early age that they may
eaily attain to wealth and honours, and various
other caufes, have gradually introduced the practice
of fendng mere boys to foreign countries, under pre-
cence of affording them opportunities of faking off
prejudices, of frowning their minds with truly uful
knowledge, and of acquiring those graceful manners
and that manly address which will enable them to ac-
quilt themselves in a becoming manner when they are
called to the duties of active life. How much trav-
elling at such an early age contributes to fulful the
views of parents, a flight survey of the fancto-house,
the gambling-rooms, the race-cource, and the cock-
pit, will readily convince the fagacious observer.

But we wish to foftcr no prejudices againft neigh-
bouming nations; we entertain no fuch prejudices in
favour of Britain, as to wish to confine our country-
men within the fea-girt life. Let us enquire, what
advantages may be gained by travelling, and at what age
it may be moft proper to fet out in paffort of thole
advantages.

After all that bookish men have urged, and nor-
withstanding all that they may continue vehemently
to urge, in behalf of the knowledge to be derived from
their beloved books; it must still be acknowledged, that
books can teach us little more than merely the lan-
guage of men. Or, if we should grant that books are
of higher importance, and that language is the leat
valuable part of the knowledge which they teach, yet
still we need to beware that they lead us not astray;
it is better to examine nature with the naked eye,
than to view her through the fpectacles of books. Neither
the theories or experiments of philosophers, nor the
narratives of travellers, nor the relations of fiftors,
though supported by a numerous train of authorities,
are worthy of implicit credit. You retirме from the
world, confine yourself for years to your cloft, and
read volume after volume, fiftors, philosophers, and
poets; at laft you fay that you have gained an im-
menfe fiore of knowledge: But leave your retirement,
return into the world, compare the knowledge which
you have trefured up with the appearances of nature;
you will find that you have laboured in vain, that it is
not only the falnace of knowledge which you have ac-
quited, and will not serve for a faithful guide in life,
nor even enable you to diftinguifh yourfelf for literary
merit. Compare the relations of travellers with one
another; how feldom do they agree when they describe
the fame scenes and the fame people! Turn your at-
tention to the moft respectable fiftors, compare
their accounts of the fame events; what difagreement!
what contrariety! Where fhall truth be found? Listen
to the cool, the candid phiilofophers; what contradic-
tory theories do they build on the fame fystem of facts.

We agree, then, that it is better to fearch knowledge
by actual obfervation and experiment, than to receive
it at fecand-hand from the information of others. He
who would gain an acquaintance with the beauties of
external nature, must view them with his own eyes;
he who would know the operations of the human un-
derftanding, muft reflect upon what paffes in his own
mind; he who would know the customs, opinions,
and manners of any people, muft mingle with them, ob-
serve their conduct, and listen to their conver-
sation. The arts are acquired by actual practice; the
sciences by actual obfervation in your own perfon, and
by deducing inferences from your obfervations.

If therefore to extend our knowledge can contri-
buthe in any degree to render us happier, wifer, or
better; travelling, as being more favourable to know-
ledge than the study of books, muft be highly advan-
tageous. Get well acquainted with your own coun-
try; with the manners, the customs, the laws, and the
political fitation of your countrymen; Get also a
knowledge of books; for books would not be altoget-
er ufelefs, though they could ferve no other purpoze
but to teach us the language in which mankind ex-
press themfelves: And then, if your judgment have at-
tained maturity; if curiosity prompt you; if your con-
stitution be robust and vigorous, and your fpirits live-
ly; you may imitate the Solons, Horers, and Pla-
tos of old, and visit foreign countries in search of know-
ledge, and with a view to bring home fomething which
may be of real utility to yourfelf and your country.
You will, by this time, be no more a foreigner in the
language of your own country, that you will not lofe it
while you are learning the languages of foreign nations;
your principles of taste and of right and wrong will
be fo formed and fixed, that you will not defpife any
inftitution or custom or opinion merely because it pre-
vails not in your own country; nor yet will you be
ready to admire and adopt any thing, merely because
it prevails among a foreign nation who are diftinguifh-
ed for profound and extenfive knowledge, or for elege-
tance of taste and manners. No; you will divest
yourfelf of every prejudice, and judge only by the
fixed unalterable principles which determine the dif-
tinction between right and wrong, between truth and
fallchord, between beauty and deformity, sublimity
and meannefs. Your object will not be to learn exotic
vices, to mingle, in frivolous amufements, or to form
a catalogue of inns. Your views, your enquiries, will
have a very different direction. You will attend to
the flate of the arts, of the fciences, of morals, man-
ners, and government; you will also con templates with
eager delight, the grand or beautiful fenes of nature,
and examine the vegetable productions of the various
regions through which you pafs, as well as the diffe-
rant tribes of animals which inhabit them; you will
observe what blessings the benefice of nature has con-
ferrd on the inhabitants of each particular division of the
globe, and how far the ingenuity and industry of man have
taken advantage of the kindnefs of nature. Thus sur-
vying the face of the earth, and considering how ad-
vantages and disadvantages are balanced with each oth-
er through every various region and climate from one
extremity of the globe to another; you will admire
and revere that impartiality with which the Author of
nature has distributed his benefits to the whole human
race. When from the chilly climes and flubborn foil
of the north, you turn your eyes to the fertile, gen-
ial regions of the south, where every tree is loaded
with exquifite fruits, and every vegetable is nour-
ishing and delicious; you will be pefuaded to find, that the
inhabitants of the north, by their superior ingenuity
and vigour, are able to raise themselves to circumstances
circumstances that render travelling unprofitable to the youth of the present age.

But though we have thus far, and we hope for obvious and solid reasons, decided in favour of travelling, as being more likely than a solitary application to books, to furnish the mind with useful and ornamental knowledge; yet we do not generally observe that youth either take care to furnish themselves with the previous knowledge which we consider as indispensably necessary in order to prepare them for travelling with advantage, or set out with proper views, or prosecute their travels in a prudent, judicious manner. After receiving a very imperfect education, in which religious and moral instruction are almost wholly neglected, and no means are used to inspire the youthful mind with solid, virtuous, manly qualities; but every art is tried to make the young man appear learned, while his mind is destitute of all useful information, and to teach him to assume the confidence of manhood before he has attained even to a moderate degree of sense and prudence;—after an education conducted in this manner, and with their views, the aspiring is educated abroad to view the world, and is expected to return home a finished character, an ornament, and comfort to his parents and all his connections. He is hitherto unacquainted, perhaps, even with the simple events of the history of his native country; and either totally ignorant of classical literature, or but very superficially instructed in it. He has not yet viewed with a discerning eye the manners and customs prevailing among his countrymen; he knows not the nature of the government under which he lives; nor the spirit of those laws by which his civil conduct must be regulated. He has no fixed principles; no clear, distinct views. But to supply all his wants of this nature, he is put into the hands of a travelling governor, who is to be entirely submissive to his will, and yet to serve him both for eyes and intellect. This governor is generally either some macaroni officer who is adorned with the present previous knowledge you may happen to possess; or clé, perhaps, some reigning fig of literature, who having spent much time among his books, without acquiring such strength or dignity of mind as to raise him above frivolity of manners and conversation or pitiful fawning airs, is therefore regarded as happily qualified for this important charge. This respectable personage and his pupil are shipped off for France, that land of elegant dilipation, frivolity, and fashion. They travel on with eager impatient till they reach the capital. There the young man is indubitably introduced to all the gay scenes which Paris can display. He is, at first, confounded; by and by his senses are fascinated; new desires are awakened in his breast; all around him he sees the sons of dilipation wallowing in debauchery, or the children of vanity flattering about like so many gaudy insects. The poor youth has no fixed principles: he has not been taught to regard vanity as ridiculous, or to turn from vice with abhorrence. No attempt is made to allure him to those objects, an attention to which can alone render travelling truly beneficial. Hitherto his mind had been left almost wholly uncultivated; and now, the seeds of vice are plentifully sown in it. From one great town he is conveyed to another, till he visits almost every place in Europe where profligacy of manners has attained to any uncommon height. In this happy course of education he probably continues to pursue improvement till he is well acquainted with most of the post-roads, the principal inns, and the great towns at least in France and Italy; and perhaps till he has worn out his confidence and rendered his mind totally incapable of any generous sentiment, or sober reflection. He then revisits his native country, to the inexplicable happiness of his parents, who now eagerly long to embrace their all-accomplished child. But how miserably are the poor folks disappointed, when they find his constitution wasted, his understanding uninformed, his heart destitute of every manly or generous sentiment; and perceive him to possess no accomplishment, but such as are merely superficial? Perhaps, however, his parents are prevented by their partiality both for their child and for the means which they have adopted in conducting his education, from viewing his character and qualifications in a true light. Perhaps they overlook all his defects, or
Education. Consider them as ornaments, and regard their dear
son as the mirror of perfection. But, unfortunately,
ly, though they be blind to the hideous deformity
of the monster which they have formed, they cannot
hinder it from being conspicuous to others; though
they may view their son's character as amiable and
respectable, they cannot render it useful, they cannot
prevent it from being hurtful to society. Let this
youth whose education has been thus wisely con-
ducted, let him be placed at the head of an opulent
fortune, advanced to a seat in the legislative body
of his country, or called to act in any public character;
how will he distinguish himself? As the virtuous pa-
triot, the honest, yet able statesman, the skilful general,
or the learned, upright judge! How will he enjoy his
fortune? Will he be the friend of the poor, the steady
supporter of the laws and constitution under whose
protection he lives? Will he show himself capable of
enjoying stiriurn cum dignitate? If we reason by the usual
laws of probability, we cannot expect that he should:
and if we observe the manners and principles of our
men of wealth and high birth who have been brought
up in this manner, we find our reasonings confirmed.
Such are the opinions which candid observation
leads us to entertain with regard to the advantages
which may be gained by travelling.

He whose mind has been judiciously cultivated, and
who has attained to maturity of judgment, if he set out
on his travels with a view to obtain real improvements,
and persist invariably in the prosecution of that view,
cannot but derive very great advantage from travel-
ing.

But again, those young men whose minds have not
been previously cultivated by a judicious education,
who set out without a view to the acquisition of real
knowledge, and who wander among foreign nations,
without attention to any thing but their luxuries, their
follies, and their vices; those poor young men cannot
gain any real improvement from their travels.

Comparatively few of the young men, who travel for
improvement, appear to derive so much advantage from
their travels as were to be wished, because they generally
receive too superficial an education, set out at too early
a period of life, and direct not their views to objects of
real utility and importance.

XI. On Knowledge of the World, and Entrance
into Life.

Much has been said concerning the utility of a
knowledge of the world, and the advantage of acquir-
ing it at an early period of life. But those who have
the most earnestly recommended this knowledge of the
world, have generally explained themselves in too inac-
curate a manner concerning it, that it is difficult to
understand what ideas they affix to it. They seem to
wish, that, in order to acquire it, young people may
be early made acquainted with all the vices and follies
of the world, introduced into polite company, carried
to public places, and not confined even from the ga-
ing-table and the fenny. Some knowledge of the
world may, no doubt, be gained by these means. But
it is surely dearly purchased; nor are the advantages
which can be derived from it so considerable, as to
tempt the judicious and affectionate parent to expose
his child to the infection of vanity, folly, and vice, for
their fake. Carry a boy or girl into public life at the age
of fourteen or fifteen; show them all the scenes of
splendid vanity and dissipation which adorn London or
Paris; tell them of the importance of drefs, and of
the ceremonies of good breeding and the forms of in-
tercourse; teach them that fashionable indifference
and dissipation which give the manners of our fine
gentlemen and fine ladies of the present age. What
effects can you expect the scenes into which you intro-
duce them, and the mysteries which you now teach
them, to produce on the minds of the children? They
have a direct tendency to infpire them with a taste for
vanity, frivolity, and dissipation.

If you wish to be like the foolish, the dissipated, and the gay,
you are likely to obtain your purpose; but if, on the con-
trary, your views are to prepare them for discharging
the duties of life, you could not adopt more improper
means: for though they be well acquainted with all
those things on which you place so much value, yet
they have not thereby gained any accession of useful
knowledge. They are not now more able than before
to estimate the real value of objects; nay, their judg-
ment is now more liable than before to be misled in
estimating the value of the objects around them. Lux-
ury, vanity, and fashion, have stamped on many things
an ideal value. By mingling at an early age in those
scenes of the world where luxury, vanity, and fashion
reign with arbitrary sway, young people are naturally
impressed with all those prejudices which give a
tendency to inspire. Instead of acquiring a useful
knowledge of the world, they are rendered incapable
of ever viewing the world with an unprejudiced and
discerning eye. If possible, therefore, we should
rather labour to confine young people from mingling in
the scenes of gay and dissipated life till after they have
attained maturity of age and judgment. They will
then view them in a proper light, and perhaps be
happy enough to escape the infectious contagion of
vice.

But there is another and a more valuable knowledge
of the world, which we ought industriously to com-
municate to them as soon as they are capable of receiv-
ing it. As soon as they are made thoroughly ac-
quainted with the distinctions between right and wrong,
between virtue and vice, between piety and impiety,
and have become capable of entering into your rea-
flections; we ought then to inform them concerning the
various establishments and institutions which exist in so-
ciety; concerning the customs, opinions, and manners
of mankind; and concerning the various degrees of
strength or weakness of mind, of ingenuity or dullness,
of virtuous or vicious qualities, which discriminate those
characters which appear in society. We ought also to
seize every opportunity which may be presented of
e xemplifying our leasons by instances in real life. We
must point out to them those circumstances which
have led mankind to place an undue value on some ob-
jects, while they appreciate others much below their
real utility and importance. Thus let us fortify their
judgments against that impression which the dazzling
novelty of the scene, and the force of passion, will be
apt to produce; and communicate to them a knowl-
edge of the world, without exposing them impre-
dently to the contagion of its vices and follies.

When at length the period arrives at which they
must be emancipated from subjection, and committed to the guidance of their own conscience and reason, and of those principles which we have laboured to inculcate on their minds: let us warn them of the dangers to which they are about to be exposed; tell them of the glory and the happiness to which they may attain, inspire them, if possible, with disdain for folly, vanity, and vice, whatever dazzling or enchanting forms they may assume; and then dismiss them to enrich their minds with new stores of knowledge by visiting foreign nations; or, if that should be inconvenient, to enter immediately on the duties of some useful employment in active life.

EDUCATION, properly signifies the rendering substances more mild. Chemical education confounds almost always in taking away acids and other faint substances; and this is effected by washing the objects which they adhere in a large quantity of water. The washing of diaphoretic antimony, powder of aragonite, &c. till the water comes off quite pure and clear: all instances of chemical education. — In pharmacy, juleps, potions, and other medicines, are said to be educorated, by adding sugar or sirup.

EDWARD, the name of several kings of England. See (History of) England.

EDWARDS (George), fellow of the royal and antiquarian societies, was born at Stratford, a hamlet belonging to Witham in Essex, England, on the 3d of April, 1694. After having spent some time at school, he was put apprentice to a tradesman in Church-street. His master, who was eminent both for his piety and skill in the languages, treated him with great kindness; but about the middle of his apprenticeship, an accident happened which totally put a stop to the hopes of young Edwards's advancing himself in the way of trade. Dr. Nicolas, a person of eminence in the physical world, and a relation of his master's, happened to die. The Doctor's books were removed to an apartment occupied by Edwards, who eagerly employed all his leisure-hours, both in the day and great part of the night, in perusing those which treated of natural history, sculpture, painting, astronomy, and curiosities. The reading of these books entirely deprived him of any inclination for mercantile business he might have formerly had, and he resolved to travel into foreign countries. In 1716, he visited most of the principal towns in Holland, and in about a month returned to England. Two years after, he took a voyage to Norway, at the invitation of a gentleman who was disposed to be his friend, and who was nephew to the master of the ship in which he had embarked. At this time Charles XII. was besieging Fredericksburg; by which means our young naturalist was hindered from making such excursions into the country as otherwise he would have done, for the Swedes were very careful to confine such strangers as could not give a good account of themselves. But notwithstanding all his precaution, he was confined by the Danish guard, who supposèd him to be a spy employed by the enemy to get intelligence of their designs. However, by obtaining testimonial's of his innocence, a release was granted. In 1718 he returned to England, and next year visited Paris by the way of Dieppe. During his stay in this country he made two journeys of two months each; the first to Chalons in Champagne, in May 1720; the second on foot, to Orleans and Blois: but an edit happening at that time to be issued for securing a grant, in order to transport them to America, as the banks of the Mississippi wanted population; our author narrowly escaped a western voyage. On his arrival in England, Mr. Edwards closely pursued his favourite study of natural history, applying himself to drawing and colouring such animals as fell under his notice. A strict attention to natural, more than picturesque beauty, claimed his earliest care; birds first engaged his particular attention; and having purchased some of the best pictures of these subjects, he was induced to make a few drawings of his own; which were admired by the curious, who encouraged our young naturalist to proceed, by paying a good price for his early labours. Among his first patrons and benefactors may be mentioned James Theobald, Esq.; of Lambeth; a gentleman zealous for the promotion of science. Our author thus unexpectedly encouraged, increased in skill and affability; and procured, by his application to his favourite pursuit, a decent subsistence and a large acquaintance. However, he remitted his industry in 1731; when, in company with two of his relations, he made an excursion to Holland and Brabant, where he collected several scarce books and prints, and had an opportunity of examining the original pictures of several great masters at Antwerp, Bruges, Utrecht, and other cities. In December 1733, by the recommendation of the great Sir Hans Sloane, Bart., president of the college of physicians, he was chosen librarian, and had apartments in the college. This office was peculiarly agreeable to his taste and inclination, as he had the opportunity of a constant recourse to a valuable library filled with scarce and curious books on the subject of natural history, which he so assiduously studied. By degrees he became one of the most eminent ornithologists in this or any other country. His merit is so well known in this respect, as to render any eulogy on his performance unnecessary: but it may be observed, that he never trifled with others what he could perform himself; and often found it difficult to give satisfaction to his own mind, that he frequently made three or four drawings to delineate the object in its most lively character, attitude, and representation. In 1743, the first volume of the History of Birds was published in quarto. His subscribers exceeding even his most sanguine expectations, a second volume appeared in 1747. The third volume was published in 1750. In 1751, the fourth volume came from the press. This volume being the last he intended to publish at that time, he seems to have considered it as the most perfect of his productions in natural history; and therefore devotedly offered it up to the great God of nature, in humble gratitude for all the good things he had received from him in this world. Our author, in 1758, continued his labours under a new title, viz. Gleanings of Natural History. A second volume of the Gleanings was published in 1760. The third part, which made the seventh and last volume of his works, appeared in 1764. Thus our author, after a long series of years, the most fluidious application, and the most extensive correspondence to every quarter of the world, concluded a work which contains engravings and descriptions of more than 600 subjects in natural history, not before published or delineated. He likewise added a general index in French and English; which was afterwards perfected, with the Linnæan names, by
EEC [364]  

Eff, or Effervesce. See Animalculæ, n° 8.

EEC in Vinegar, are similar to those in four-pale. The taste of vinegar was formerly thought to be occasioned by the bitting of these little animals, but that opinion has been long ago exploded. Mentzelius says, he has observed the actual transformation of these little creatures into flies; but as this hath never been observed by any other person, nor is there an instance of such a transformation in any other animalculæ, it seems probable that Mentzelius hath been mistaken in his observations.

Efface', or Effray', in heraldry, a term applied to a beast rearing on its hind legs, as if it were frightened or provoked.

Efface, in a general sense, is that which results from, or is produced by, any cause. See Cause.

Effeminate, womanish, unmanly, voluptuous.

Effeminate (Effeminatus), according to the vulgar, are mentioned in several pieces of scripture. The word is there used to signify such as were consecrated to some profane god, and prostituted themselves in honour of him. The Hebrew word kadesh, translated effeminatus, properly signifies consecrated, and hence was attributed to those of either sex, who publicly prostituted themselves in honour of Baal and Astart. Moes expressly forbids these irregularities among the Israelites; but the history of the Jews shows, that they were notwithstanding frequently practised. Levit. xxiii. 18.

Effendi, in the Turkish language, signifies master; and accordingly it is a title very extensively applied; as, to the mufli and emirs, to the priests of mosques, to men of learning, and of the law. The grand chancellor of the empire is called reis-effendi.

Effervescence, an intetine motion excited betwixt the parts of two bodies of different nature,
when they reciprocally dissolve each other. Effervescences are commonly attended with bubbles, vapours, small jets of the liquid, and a hissing noise; and these phenomena are occasioned by the air which at that time dissolves itself. Sometimes also they are accompanied with a great degree of heat, the cause of which is not so well known.

Formerly the word fermentation, was also applied to effervescences; but now that word is confined to the motion naturally excited in animal and vegetable matters, and from which new combinations among their principles take place.

**EFFIGY**, the portrait, figure, or exact representation of a person.

**Effigy,** is also used for the print or impression of a coin, representing the prince's head who struck it.

**Effigy, to execute or degrade in,** denotes the execution or degradation of a condemned tumultuous criminal, who cannot be apprehended or feized in France, they hang a picture on a gallows or gibbet, wherein is represented the criminal, with the quality or sentence or degradation of a person. Wherein is represented the criminal, with the quality or sentence or degradation of a person.

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**EFFLORESCENTIA,** in botany (from *effloresco* to bloom): the precise time of the year and month in which every plant flows its first flowers.

Some plants flower twice a year, as is common between the tropics; others, often, as the monthly role. The former are called by botanists *bifera*; the latter, *multifera*.

The time of flowering is determined by the degree of heat which each species requires. Mezerieon and snow-drop produce their flowers in February; primroses, in the beginning of March; the greater number of plants, during the month of May; corn, and other grain, in the beginning of June; the vine, in the middle of the same month; several compound flowers, in the months of July and August; lastly, meadow-saffron flowers in the month of October, and announces the speedy approach of winter.

Gras of Parthenifl always flowers about the time of cutting down the hay; and in Sweden, the different species of thistle, mountain lettuce, fuccory, and balm, seldom flower till after the summer solstice: the country-men even know, as by a calendar, that the solstice is past when these plants begin to produce their flowers.

The temperature of the seasons has a mighty influence both in accelerating and retarding the flowering of plants. All plants are earlier in warm countries; hence such as are cultivated out of their native soil, never flower till the heat of the climate, or situation into which they are removed, is equal to that under the influence of which they produced flowers in their own country. For this reason, all exotics from warm climates are later in Britain than many plants which it naturally produces.

In general, we may observe, that the plants of the coldest countries, and those produced on the mountains in all climates, being of equal temperature, flower about the same time, viz. during the spring in Europe.

Plants that grow betwixt the tropics, and those of temperate climates, flower during our summer.

Plants of temperate climates, situated under the same parallel of latitude with certain parts of Europe, but removed much farther to the south, such as Canada, Virginia, and Miflimi, do not produce flowers till autumn.

Plants of temperate climates in the opposite hemisphere to Europe, flower during our winter, which is the summer of these regions.

Linnaeus and Adanson have given a sketch of the different times in which plants flower at Upfal, and Paris.

**EFFLUVIIUM,** in physiology, a term much used by philosophers and physicians, to express the minute particles which exhale from most, if not all, terrestrial bodies, in form of insensible vapours.

**EFFRONTE,** in church-history, a sect of heretics, in 1534, who scraped their forehead with a knife till it bled, and then poured oil into the wound. This ceremony served them instead of baptism. They are likewise said to have denied the divinity of the Holy Spirit.

**EFFUSION,** the pouring out of any liquid thing with some degree of force. In the ancient heathen sacrifices
Egg

**Egg** [366]

**Egg**, in physiology, a body formed in certain females, in which is contained an embryo or fetus of the same species, under a cortical surface or shell. The exterior part of an egg is the shell; which in a hen, for instance, is a white, thin, and friable cortex, including part of the dividing egg, as divided when laid; for as the fetus increases, the albumen becomes more humid, and like melting ice, or fat; whereby it takes up more space. For as the fetus increases, the albumen insensibly waxes away and condenses: the vitellus, on the contrary, seems to lose little or nothing of its bulk when the fetus is perfected, and only appears more liquid and humid when the abdomen of the fetus begins to be formed.

The chick in the egg is first nourished by the albumen: and when this is consumed, by the vitellus, as with milk. If we compare the chalaza to the extremities of an axis passing through the vitellus, which is of a spherical form, this sphere will be composed of two unequal proportions; its axis passing through its centre; consequently, since it is heavier than the white, its smaller portion must always be uppermost in all positions of the egg.

The yellowish white round spot, called *siccatrice*, is placed on the middle of the smaller portion of the yolk; and therefore, from what has been said in the last paragraph, must always appear on the superior part of the vitellus.

Not long before the exclusion of the chick, the whole yolk is taken into its abdomen; and the shell, at the obtuse end of the egg, frequently appears cracked some time before the exclusion of the chick. The chick is sometimes observed to perforate the shell with its beak. After exclusion, the yolk is gradually wasted, being conveyed into the small-guts by a small duct.

Eggs differ very much according to the birds that lay them, as to their colour, form, bigness, age, and the different way of dressing them: those most used in food are hen's eggs; of which, such as are new-laid are best.

As to the preservation of eggs; it is observed that the egg is always quite full when it is first laid by the hen; but from that time it gradually becomes less and less, to its decay: and however compact and close its shell may appear, it is nevertheless perforated with a multitude of small holes, though too minute for the discernment of our eyes, the effect of which is a daily decrease of matter within the egg, from the time of its being laid; and the preservation is much quicker in hot weather than in cold.

To preserve the egg fresh, there needs no more than to preserve it full, and stop its transpiration; the method of doing which is, by stopping up the pores with matter which is not soluble in watery fluids: and on this principle it is, that all kinds of varnish, prepared with spirit of wine, will preserve eggs fresh for a long time, if they are carefully rubbed all over the shell; tallow, or mutton fat, is also good for this purpose; for such as are rubbed over with this, will keep as long as those coated over with varnish.

The artificial method of hatching eggs. See Hatching.

Eginha. See Æginha.

Eginhart, secretary to the emperor Charles the Great, was a German. He was the most ancient historian of that nation, and wrote very eloquently for a man of the 9th century. It is said, that he acquainted himself so well into the favour of Imma, daughter to Charles the Great, that he obtained from her whatever he desired. Charles the Great, having found out the intrigue, did not do as Augustus, who is thought to have banished Ovid because he believed him to be too much favoured by Julia; for he married the two lovers together, and gave them a fine estate in land.

Eglantine, in botany. See Rosa.

Eglon, a king of the Moabites, who oppressed the Israelites for 18 years (Judges iii. 12–14.) Cachmet confounds this servitude of the Hebrews with that under Cuthan-ruthathaim, making it to subsist only eight years, from the year of the world 2591 to 2599; whereas
whereas this servitude under Eglon lasted 18 years, and
commenced in the year of the world 2661, and 62
years after they had been delivered by Othniel from
the subjection of Cushan-rushathaim.

EGRA, a town of Bohea, formerly imperial, but
now subject to the house of Austria. It contains a great
number of able artists, and is famous for its mun-
ificent waters. Wallenstein, the emperor's general, was
affidivated here in 1634. The French became masters
of this town in 1741; but afterwards being blocked
up, they were forced to capitulate on September 7th,
1743. It is looked upon as a town of the greatest
consequence in Bohemia, except Prague. It is sit-
ated on a river of the same name, in E. Long. 12. 30.
N. Lat. 50. 21.

EGRET, in ornithology, a species of ardea. See
ARDEA.

EGYPT, an extensive country of Africa, lying be-
tween 30° and 36° of east longitude, and between 21°
and 31° of north latitude. It is bounded by the Me-
diterranean on the north; by the Red-Sea and Ithmus of
Suez, which divide it from Arabia; by Aby-
finia or Ethiopia, on the south; and by the des-
ferts of Barca and Nubia, on the west; being 600 miles
in length from north to south, and from 100 to 200
in breadth from east to west.

As a nation, the Egyptians may with justice lay claim
to as high antiquity as any in the world. The country
was most probably peopled by Mizraim the son of Ham
and grandson of Noah. By its ancient inhabitants it
was called Chemi, and is still called Chemi in the lan-
guage of the Copts or native Egyptians; and this
name it is supposed to have received from Ham the son
of Noah. In scripture we find it most generally nam-
ed Mizraim; though in the Psalms it is styled the land
of Ham.—To us it is best known by the name of E-
gypt, the etymology of which is more uncertain.—
Some derive it from Egyptus, a supposed king of the
country; others say it signifies no more than "the
land of the Copts;" He in Greek signifying a country,
and Egeus being easily softened into Egyptus.—The
most probable opinion, however, seems to be, that it
received this name from the blackness of its soil, and
the dark colour both of its river and inhabitants: for
such a blackish color is from the Greeks called eggus
from gyos, and eggos "a vulture," and by the La-
tins, jubulensius. For the same reason, other names of
a familiar import have been given to this country by
the Greeks; such as Aegus, and Melambolis; the
river itself was called Molo or Melas; by the Hebrews,
Shpar; and by the Ethiopians, Siris; all of which signi-
fy "black."

Ancient Egypt is by some divided into two parts, the
Upper and Lower Egypt; by others into three, the Up-
per Egypt, properly so called, or Thebaïs; the Middle
Egypt, or Hæpsynous; and the lower Egypt, the left
part of which was the Delta, or that space compre-
ended by the branches of the Nile. See TEBAEI, &c.

The Egyptians, like the Chinees, pretend to an
excessive antiquity; pretending to have records for ten,
twenty, or even fifty thousand years. Thus their his-
tory is so much involved in obscurity and fable, that
for many ages it must be passed over in silence.—The
first mortal king whom the Egyptians own to have
reigned in that country, was Menes or Memoo. At
what time he reigned, it would be too little pur-
pose to enquire. He had been preceded, however, by
a host of immortals, who it seems left him the kingdom
in a very bad situation; for the whole country, except
Thebaïs, was a morass; the people abed were entirely
delitute of religion, and every kind of knowledge
which could render their life comfortable and happy.

Menes diverted the course of the Nile; which before
that time had washed the foot of a sandy mountain
near the borders of Libya, built the city of Memphis,
instructed his subjects, and did other things of a simi-
lar kind which are usually attributed to the founders
of kingdoms.

From the time of Menes, the Egyptian chronology
In invaded by
is filled with a list of kings who reigned 1400 thep-
years, but did nothing worthy of notice.—The first
herds, distinct piece of history we find concerning Egypt, is
the irruption of the Shepherds, by whom the country
was subdu'd; but whether this revolution happened
during the vast interval of indolence abovementioned,
or before or after, cannot be known. The affair is
thus related by Manetho and Imhotep, or the abridged
of Timaus king of Egypt, that God being displeased
with the Egyptians, they suffered a great revolution:
for a multitude of men, ignoble in their race, took
courage, and, pouring from the east into Egypt, made
war with the inhabitants; who submitted to them with-
out resistance. The shepherds, however, behaved with
the greatest cruelty; burnt the cities, threw down the
temples of the gods, and put to death the inhabitants,
carrying the women and children into captivity.
This people came from Arabia, and were called Hysos, or
king-shepherds. They held Egypt in subjection for 250
years; at the end of which period, they were obliged
by a king of Upper Egypt, named Amonis, or Seth-
mathis, to leave the country. This prince's father had,
It seems, gained great advantages over them, and shut
them up in a place called Hahor or Avaris, contain-
ing 10,000 acres of land. Here they were closely be-
"sieg'd by Amolis, with an army of 400,000 men; but
at last the king, finding himself unable to reduce them
by force, proposed an agreement, which was readily
accepted. In consequence of this agreement, the shep-
herds withdrew from Egypt with their families, to the
number of 240,000; and, taking the way of the de-
sert entered Syria; but tearing the Assyrians, who were
then very powerful, and masters of Asia, they enter-
ed the land of Judaea, and built there a city capable
of holding 50 great a multitude, and called it Jeru-
alem.

According to Mr Bruce, the shepherds who invaded
Egypt were no other than the inhabitants of Barabra.
They were, he says, carriers to the Cubites who lived
further to the south. The latter had built the many
fate temples in Thebes and other cities of Egypt;
though, according to him, they had no dwelling-places
but holes or caves in the rocks. Being a commercial
people, they remained at home collecting and prepa-
ring their articles, which were dispersed by the bar-
beras or shepherds already mentioned. Thence, from
the nature of their employment, lived in moveable habi-
tations, as the Tartars do at this day. By the He-
bews, he tells us, they were called phut, or shep-
herds by every other people; and from the name baraber,
the word Barabara is derived. By their employment, which
was the dispersing the Arabian and African goods all
over
of trial of their abilities against the Arabsians. In this
expedition Sesostris proved successful, and in the end
succeeded that people who had never before been
conquered. He was sent the westward, and conquered
the greatest part of Africa; nor could he be stopped
in his career till he arrived at the Atlantic ocean.
Whilst he was on this expedition, his father died;
and then Sesostris resolved to fulfill the prediction of
Vulcan, by actually conquering the whole world. As
he knew that this must take up a long time, he pre-
pared for his journey in the best manner possible.
The kingdom he divided into 36 provinces, and endeav-
oured to secure the affections of the people by gifts both
of money and land. He forgave all who had been guilty
of offences, and discharged the debts of all his fol-
diers.

He then constituted his brother Arais the su-
preme regent; but forbade him to use the diadem, and
commanded him to offer no injury to the queen or her
children, and to abstain from the royal concubines.
His army consisted of 600,000 foot, 24,000 horse,
and 27,000 chariots. Besides these land-forces, he
had at sea two mighty fleets; one, according to Dio-
dorus, of 400 sail. Of these fleets, one was desig-
ned to make conquests in the west, and the other in the
east; and therefore the one was built on the Medi-
terranean and the other on the Red Sea. The first of
these conquered Cyprus, the coast of Phoenicia, and
several of the islands called Cyclades; the other con-
quered all the coasts of the Red Sea; but its progress
was stopped by hostile and difficult places which the
navigator could not pass, so that he seems not to have
made many conquests by sea.

With the land-forces Sesostris marched against the
Ethiopians and Troglobities; whom he overcame, and
obliged them to pay him a tribute of gold, ebony, and
ivory. From thence he proceeded as far as the promon-
tory of Dira, which lay near the straits of Babelmandel,
where he set up a pillar with an inscription in sacred
characters. He then marched on to the country
where cinnamon grows, or at least to some country
where cinnamon at that time was brought, probably
some place in India; and here he in the same manner set
up pillars, which were to be seen for many ages after.

As to his farther conquests, it is agreed by almost all
authors of antiquity, that he overran and pillaged the
whole continent of Asia, and some part of Europe.
He crossed the Ganges, and erected pillars on its
banks; and from thence he is said to have marched
eastwards to the very extremity of the Asiatic conti-
inent. Returning from thence, he invaded the Scy-
thians and Thracians; but all authors do not agree
that he conquered them. Some even affirm, that he
was overthrown by them with great slaughter, and ob-
ligated to abandon a great part of his booty and mil-
itary stores. But whether he had good or bad suc-
cess in these parts, it is a common opinion that he
settled a colony in Colchis. Herodotus, however, who
gives the most particular account of the conquests of
this monarch, does not say whether the colony was
designedly planted by Sesostris, or whether part of
his army loitered behind the reti, and took up their
residence in that region. From his own knowledge,
he affirms, that the inhabitants of that country were
undoubtedly of Egyptian descent. This was evident
from the personal resemblance they bore to the Egyp-
tians,
E Y

Egypt, who were swarthly-complexioned and frizzle-haired; but more especially from the conformity of their customs, particularly circumcision.

The utmost boundary of this mighty monarch's conquest, however, was in the country of Thrace; for beyond this country his pillars were no where to be seen. These pillars he was accustomed to set up in every country which he conquered, with the following inscription, or one to the same purpose: "Sezofiris, king of kings, and lord of lords fenced this country with the power of his arms." Besides these, he left also statues of himself; two of which, according to Herodotus, were to be seen in his time; one on the road between Ephesus and Phocaea, and the other between Smyrna and Sardis: they were armed after the Egyptian and Ethiopian manner, holding a javelin in one hand and a bow in the other. Across the beach they had a line drawn from one shoulder to the other, with the following inscription; "This region I obtained by these my shoulders." These were mistaken for images of Memnon.

The reasons given by Sesostris for his returning into Egypt from Thrace, and thus leaving the conquest of the world unfinished, were the want of provisions for his army, and the difficulty of the passes. Most probably, however, his return was hastened by the intelligence he received from the high priest of Egypt, concerning the rebellious proceedings of his brother; who, encouraged by his long absence, had assumed the diadem, violated the queen, and also the royal concubines. On receiving this news, Sesostris hastened from Thrace; and at the end of nine years came to Pelusium in Egypt, attended by an Innumerable multitude of captives taken from many different nations, and loaded with the spoils of Asia. The treacherous brother met him at this city; and it is said, with very little probability, that Sesostris accepted of an invitation to an entertainment from him. At this he drank freely, together with the queen and the rest of the royal family. During the continuance of the entertainment, Armais caused a great quantity of dried reeds to be laid round the apartment where they were to sleep; and as soon as they were retired to rest, set fire to the reeds. Sesostris perceiving the danger he was in, and that his guards, overcharged with liquor, were incapable of affilling him, rushed through the flames, and was followed by his wife and children. In thanksgiving for this wonderful deliverance, he made several donations to the gods, particularly to Vulcan the god of fire. He then took vengeance on his brother Armais, to be the Danaus of the Greeks, who, being on this occasion driven out of Egypt, withdrew into Greece.

Sesostris now laid aside all thoughts of war, and applied himself wholly to such works as might tend to the public good, and his own future reputation. In order to prevent the incursions of the Syrians and Arabsians, he fortified the east side of Egypt with a wall which ran from Pelusium through the defert to Helopolis, for 1874 miles. He raised also an incredible number of vall and lofty mounts of earth, to which he removed such towns as had been before been situated too low, in order to secure them from the inundations of the Nile. All the way from Memphis to the sea he dug canals which branched out from the Nile; and not only made an easier communication between different places, but rendered the country in a great measure impallable to any enemy. He erected a temple in every city in Egypt, and dedicated it to the supreme deity of the place; but in the course of such a great undertaking as this necessarily must have been, he took care not to employ any of his Egyptian subjects. Thus he secured their affection, and employed the vast multitude of captives he had brought along with him; and to perpetuate the memory of a tranfdation so remarkable, he caused to be inscribed on all these temples, "No one native labourer hereon." In the city of Memphis, before the temple of Vulcan, he raised six gigantic statues, each of one stone. Two of them were 30 cubits high, representing himself and his wife; the other four were 20 cubits each, and represented his four sons. These he dedicated to Vulcan in memory of his abovementioned deliverance. He raised also two obelisks of marble 180 cubits high, and charged them with inscriptions, denoting the greatness of his power, his revenues, &c.

The captives taken by Sesostris are said to have been treated with the greatest barbarity; so that at last they resolved at all events to deliver themselves from a servitude so intolerable. The Babylonians particularly were concerned in this revolt, and laid waste the country to some extent; but being offered a pardon and a place to dwell in, they were pacified, and built for themselves a city which they called Babylon. Towards the conquered princes who waited on him with their tribute, the Egyptian monarch behaved with unparalleled insolence. On certain occasions he is said to have unharnessed his horses, and, yoking kings together, made them draw his chariot. One day, however, observing one of the kings who drew his chariot to look back upon the wheels with great earnestness, he asked what made him to look so attentively at them? The unhappy prince replied, "O king, the going round of the wheel puts me in mind of the vicissitudes of fortune: for as every part of the wheel is uppermost and lowermost by turns, so it is with men: who one day sit on a throne, and on the next are reduced to the vilest degree of slavery." This answer brought the insulting conqueror to his senses; so that he gave over the practice, and henceforth treated his captives with great humanity. At length this mighty monarch his death, loosed his fet, and laid violent hands on himself.

After the death of Sesostris, we meet with another chasm of an indeterminate length in the Egyptian history. It concludes with the reign of Amasis or Ammisod ; who being a tyrant, his subjects joined Achiæs the king of Ethiopia to drive him out. Thus Achiæs became master of the kingdom; and after his death follows another chasm in the history, during which the empire is said to have been in a state of anarchy for five generations. This period brings us down to the times of the Trojan war. The reigning prince in Egypt was at that time called Cetes; by the Greeks, Protæs. The priest reported that he was a magician; and that he could assume any shape he pleased, even that of fire. This fable, as told by the Origin of Greeks, drew its origin from a custom among the E- the Libyans, perhaps introduced by Protæs. They were Protæs used to adorn and distinguish the heads of their kings with the representations of animals or vegetables, or
even with burning incense, in order to strike the beholder with the greater awe. Whilst Proteus reigned, Paris or Alexander, the son of Priam king of Troy, was driven by a storm on the coast of Egypt, with Helen, whom he was carrying off from her husband. But when the Egyptian monarch heard of the breach of hospitality committed by Paris, he seized him, his mistresses, and companions, with all the riches he had brought away with him from Greece. He detained Helen, with all the effects belonging to Menelaus her husband, promising to restore them to the injured party whenever they were demanded; but commanded Paris and his companions to depart out of his dominions in three days, on pain of being treated as enemies. In what manner Paris afterwards prevailed upon Proteus to restore his mistresses, we are not told; neither do we know any thing farther of the transactions of this prince’s reign nor of his successors, except what has entirely the air of fable, till the days of Proteus, till the days of Paris or Alexander, the son of Priam king of Troy, was driven by a storm on the coast of Egypt, with Helen, whom he was carrying off from her husband. But when the Egyptian monarch heard of the breach of hospitality committed by Paris, he seized him, his mistresses, and companions, with all the riches he had brought away with him from Greece. He detained Helen, with all the effects belonging to Menelaus her husband, promising to restore them to the injured party whenever they were demanded; but commanded Paris and his companions to depart out of his dominions in three days, on pain of being treated as enemies. In what manner Paris afterwards prevailed upon Proteus to restore his mistresses, we are not told; neither do we know any thing farther of the transactions of this prince’s reign nor of his successors, except what has entirely the air of fable, till the days of Proteus, till the days of

### Remarkable Story of Sethon

Soon after the death of Sethon, the form of government in Egypt was totally changed. The kingdom was divided into twelve parts, over which as many of the chief nobility prefixed. This division, however, subsisted but for a short time. Phammitichus, one of the twelve, dethroned all the rest, 15 years after the division had been made. The history now begins to be divested of fable; and from this time may be accounted equally certain that with any of that other nation. The vast conquests of Sesostris were now no longer known; for Phammitichus полифted no more than the country of Egypt itself. It appears, indeed, that none of the successors of Sesostris, or even that monarch himself, had made use of any means to keep in subjection the countries he had once conquered. Perhaps, indeed, his design originally was rather to pile up than to conquer; and therefore, on his return, his vast empire vanished at once. Phammitichus, however, endeavoured to extend his dominions by making war on his neighbours; but by putting more confidence in foreign auxiliaries than in his own subjects, the latter were so much offended, that upwards of 200,000 fighting men emigrated in a body, and took up their residence in Ethiopia.—To repair this loss, Phammitichus earnestly applied himself to the advancement of commerce; and opened his ports to all strangers, whom he greatly caressed, contrary to the cruel maxims of his predecessors, who refused to admit them into the country. He also laid siege to the city of Azous in Syria, which held out for 29 years against the whole strength of the kingdom; from which we may gather, that, as a warrior, Phammitichus was by no means remarkable. He is reported to have been the first king of Egypt that drank wine. He also went to discover the springs of the Nile; and is said to have attempted to discover the most ancient nation in the world by the following method. Having procured two newly born children, he caused them to be brought up in such a manner that they never heard a human voice. He imagined that these children would naturally speak the original language of mankind: therefore, when, at two years of age, they pronounced the Phrygian word *kecos* (or some found resembling it), which signifies bread, he concluded, that the Phrygians were the most ancient people in the world.

Nechus, the son and successor of Phammitichus, is succeeded the Pharaoh-Necho of scripture, and was a prince of an enterprising and warlike genius. In the beginning of his reign, he attempted to cut through the isthmus of Suez, between the Red Sea and the Mediterranean; but, through the insuperable obstacles which nature has thrown in the way of such undertakings, he was obli-

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The reign of Apries, the Pharoh-Hophra of Scripture, presents us with a new revolution in the Egyptian affairs. He is represented as a martial prince, and in the beginning of his reign very successful. He took by storm the rich city of Sidon; and having overcome the Cyripiots and Phenicians in a sea-fight, returned to Egypt laden with spoil. This success probably incited Zedekiah king of Judaea to enter into an alliance with him against Nebuchadnezzar king of Babylon. The bad success of this alliance was foretold by the prophet Jeremiah; and accordingly it happened. For Nebuchadnezzar having fat down with his army before Jerusalem, Apries marched from Egypt with a design to relieve the city; but no sooner did he perceive the Babylonians approaching him, than he retired as fast as he could. After he had been exposed to the rage of their merciless enemies; who were thereupon treated as Jeremiah had foretold; and by this step Apries brought upon himself the vengeance denounced by the same prophet. — The manner in which these predictions were fulfilled is as follows: The Cyrenecans, a colony of the Greeks, being greatly strengthened by a numerous supply of their countrymen under their third king Battus styled the Happy, and encouraged by the Pythian oracle, began to drive out their Libyan neighbours, and share their possessions among themselves. Hereupon Andican king of Libya sent a submissive embassy to Apries, and implored his protection against the Cyrenecans. Apries complied with him, and sent a body of native mariners to yield him relief. The Egyptians were defeated with great slaughter; and those who returned complained that the army had been sent off by Apries in order to be destroyed, and that he might tyrannize without control over the remainder of his subjects. This thought catching the attention of the giddy multitude, an almost universal defection ensued. Apries sent one Amasis, a particular friend, in whom he thought he could confide, to bring back his people to a sense of their duty. But by this friend he was betrayed; for Amasis, taking the opportunity of the present ferment, caused himself to be proclaimed king. Apries then dispatched one Patarbemis, with orders to take Amasis and bring him alive before him. This he found impossible, and therefore returned without his prisoner; at which the king was so enraged, that he commanded Patarbemis's nose and ears to be cut off. This piece of cruelty completed his ruin; for when the rest of the Egyptians who continued faithful to Apries beheld the inhuman mutilation of so worthy and noble a person as Nebuchadnezzar was, they to a man deferted Apries, and went over to Amasis.

Both parties now prepared for war; the usurper having under his command the whole body of native Egyptians; and Apries only those Ionians, Carians, and other mercenaries whom he could engage in his service. The army of Apries amounted only to 30,000; but, though greatly inferior in number to the troops of his rival, as he well knew that the Greeks were much superior in valour, he did not doubt of victory. Nay, so far was Apries puffed up with this notion, that he did not believe it was in the power even of any God to deprive him of this kingdom. The two armies soon met, and drew up in order of battle near Memphis. A merciless engagement ensued; in which, though the army of Apries behaved with the greatest resolution, they were at last overpowered with numbers, and utterly defeated, the king himself being taken prisoner. Amasis now took possession of the throne without opposition. He confined Apries in one of his palaces, but treated him with great care and respect. The people, however, were insensible, and could not be satisfied while he enjoyed his life. Amasis, therefore, at last found himself obliged to deliver him into their hands. Thus the prediction received its final completion: Apries was delivered up to those who sought his life; and who no sooner had him in their power, than they strangled him, and laid his body in the sepulchre of his ancestors.

During these intestine broils, which must have greatly weakened the kingdom, it is probable that Nebuchadnezzar invaded Egypt. He had been for 3 years before this employed in besieging Tyre, and had not had hezazzar anything but a name: or, indeed, to say the least, nothing but an empty city for his pains. To take himself some amends, therefore, he entered Egypt, miserably harassed the country, killed and carried away great numbers of the inhabitants, so that the country did not recover from the effects of this incursion for a long time after. In this expedition, however, he seems not to have aimed at any permanent conquest, but to have been induced to it merely by the love of plunder, and of this he carried with him an immense quantity to Babylon.

During the reign of Amasis, Egypt is said to have been perfectly happy, and to have contained 20,000 minifrapopolous cities. That good order might be kept among such vast numbers of people, Amasis enacted a Amatis law, by which every Egyptian was bound once a-year to inform the governor of his province by what means he gained his livelihood; and if he failed of this, to put him to death. The same punishment he decreed to those who could not give a satisfactory account of themselves.

This monarch was a great favourer of the Greeks, and married a woman of Grecian extract. To many...
Greek cities, as well as particular persons, he made considerable presents. Besides these, he gave leave to the Greeks in general to come into Egypt, and settle either in the city of Naucratis, or carry on their trade upon the sea-coasts; granting them also temples, and places where they might erect temples to their own deities. He received also a visit from Solon the celebrated Athenian lawyer, and reduced the island of Cyprus under his suzerainty.

This great prosperity, however, ended with the death of Amasis, or indeed before it. The Egyptian monarch had some how or other incurred Cambyses king of Persia. The cause of the quarrel is uncertain; but whatever it was, the Persian monarch vowed the destruction of Amasis. In the mean time Phanes of Halicarnassus, commander of the Grecian auxiliaries in the pay of Amasis, took some private dilguft; and leaving Egypt, embarked for Persia. He was a wise and able general, perfectly well acquainted with every thing that related to Egypt; and had great credit with the Greeks in that country. Amasis was immediately sensible how great the loss of this man would be to him, and therefore sent after him a trusty escort with a swift galley. Phanes was accordingly overtaken in Lycia, but not brought back; for, making his guard drunk, he continued his journey to Persia, and presented himself before Cambyses, as he was meditating the destruction of the Egyptian monarch.

At this dangerous crisis also, the Egyptian monarch imprudently made Polycrates the tyrant of Samos his enemy. This man had been the most remarkable perhaps of any recorded in history, for an uninterrupted course of success, without the intervention of one single unfortunate event. Amasis, who was at this time in a extreme alliance with Polycrates, wrote him a letter, in which, after congratulating him on his prosperity, he told him that he was afraid left his successors were too many, and he might be suddenly thrown down into the greatest misery. For this reason he advised him voluntarily to take away something from his own happiness; and to cast away that which would grieve him most if he was accidently to lose it. Polycrates followed his advice, and threw into the sea a signet of manner. This, however, did not answer the intended purpose. The signet happened to be swallowed by a fish, which was taken a few days afterwards, and thus was refolded to Polycrates. Of this Amasis was no sooner informed, than considering Polycrates as really unhappy, and already on the brink of destruction, he resolved to put an end to his friendship which subsisted between them. For this purpose he dispatched an herald to Samos, commanding him to acquaint Polycrates, that he renounced his alliance, and all the obligations between them; that he might not mourn his misfortune with the sorrow of a friend.

Thus Amasis left Polycrates at liberty to aff right against him, if he chose to do so; and accordingly he offered to aff right Cambyses with a fleet of ships in his Egyptian expedition.

Amasis had, however, the misfortune to see the calamities of his country. He died about 525 years before Christ, after a reign of 44 years; and left the kingdom to his son Phamenitus, just as Cambyses was approaching the frontiers of the kingdom. The new prince was scarce seated on the throne, when the Persians appeared. Phamenitus drew together what forces he could, in order to prevent them from entering the kingdom. Cambyses, however, immediately laid siege to Pelium, and made himself master of it by the following stratagem: he placed in the front of his army a great number of cats, dogs, and other animals that were deemed sacred by the Egyptians. He then attacked the city, and took it by a sudden opposition; the garrison, which consisted entirely of Egyptians, not daring to throw a dart or shoot an arrow against their enemies, left they should kill some of the holy animals.

Cambyses had scarce taken possession of the city, when Phamenitus advanced against him with a numerous army. But before the engagement, the Greeks who served under Phamenitus, to show their indignation against their treacherous countryman Phanes, the Egyptians brought their children into the camp, killed them in the presence of their father and of the two armies, and then drank their blood. The Persians, enraged at so cruel a sight, fell upon the Egyptians with the utmost fury, put them to flight, and cut the greatest part of them in pieces. Tho in who escaped fled to Memphis, where they were soon after guilty of a horrid outrage. Cambyses sent a herald to them in a ship from Mytilene: but no sooner did they see her come into the port, than they fled to the shore, destroyed the ship, and tore to pieces the herald and the crew; afterwards carrying their mangled limbs into the city, in a kind of barbarous triumph. Not long after, they were obliged to surrender; and thus Phamenitus fell into the hands of his invertebrate enemy, who was now enraged beyond measure at the cruelties exercised upon the children of Phanes, the herald, and the Mitylenean sailors.

The rapid success of the Persians struck with such terror the Libyans, Cyreneans, Barcians, and other dreadful enemies or allies of the Egyptian monarch, that they immediately submitted. Nothing now remained but to dispose of the captive king, and revenge on him and his subjects the cruelties which they had committed. This the merciful victor executed in the severest manner. On the roth day after Memphis had been taken, Phamenitus and the chief of the Egyptian nobility were ignominiously sent into one of the suburbs of that city. The king being there seated in a proper place, saw his daughter coming along in the habit of a poor slave with a pitcher to fetch water from the river, and followed by the daughters of the greatest families in Egypt, all in the same miserable garb, with pitchers in their hands, drowned in tears, and loudly bemoaning their miserable situation. When the father saw their daughters in this distress, they burst into tears, all but Phamenitus, who only cast his eyes on the ground and kept them fixed there. After the young women, came the son of Phamenitus, with 2000 of young nobility, all of them with bits in their mouths and halters round their necks, led to execution. This was done to expiate the murder of the Persian herald and the Mitylenean sailors; for Cambyses caused ten Egyptians of the first rank to be publicly executed for every one of those that had been slain. Phamenitus, however, observed the same conduct as before, keeping his eyes steadfastly fixed on the ground, though all the Egyptians around him made the loudest lamentations.

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The Egyptians were now reduced to the lowest degree of slavery. Their country became a province of the Persian empire: the body of Amasis their late king was taken out of his grave; and after being mangled in a shocking manner, was finally burnt. But what seemed more grievous than all the rest, their god Apis was slain, and his priests ignominiously scourged; and this inspired the whole nation with such an hatred to the Persians, that they could never afterwards be reconciled to them. As long as the Persian empire subsisted, the Egyptians could never shake off their yoke. They frequently revolted indeed, but were always overthrown with prodigious loss. At last they submitted, without opposition, to Alexander the Great: after his death, Egypt again became a powerful kingdom; though since the conquest of it by Cambyses to the present time, it hath never been governed but by foreign princes agreeable to the prophecy of Ezekiel, "There shall be no more a prince of the land of Egypt."

On the death of Alexander the Great, Egypt, together with Libya, and that part of Asia which borders on Egypt, were allotted to Ptolemy Lagus as governor under Alexander's son by Roxana, who was but newly born. Nothing was farther from the intention of this governor, than to keep the provinces in truth for another. He did not, however, assume the title of king, till he perceived his authority so firmly established that it could not be shaken; and this did not happen till 19 years after the death of Alexander, when Antigonus and Demetrius had unsuccessfully attempted the conquest of Egypt.

From the time of his first establishment on the throne, Ptolemy, who had assumed the title of Soter, reigned 20 years; which added to the former 19, make up the 39 years which historians commonly allow him to have reigned alone. In the 39th year of his reign, he made one of his sons, named Philadelphia, partner in the empire; declaring him his successor, to the prejudice of his eldest son named Ceraunus; being excited thereto by his violent love for Berenice Philadelphus's mother. When the succession was thus settled, Ceraunus immediately quitted the court; and fled at last into Syria, where he was received with open arms by Seleucus Nicator, whom he afterwards murdered.

The most remarkable transaction of this reign was the embellishing of the city of Alexandria, which Ptolemy made the capital of his new kingdom, and of which an account is given under the article Alexandria. About 284 years before Christ, died Ptolemy Soter, in the 41st year of his reign, and 84th of his age. He was the first prince of his race; and left behind him an example of prudence, justice, and clemency which few of his successors chose to follow. Besides the provinces originally assigned to him, he had added to his empire those of Cilicia, Syria, Ethiopia, Pamphylia, Lycia, Caria, and some of the Cyclades. His successor, Ptolemy Philadelphus, added nothing to the extent of the empire; nor did he perform any thing worthy of notice except embarking further the city of Alexandria, and entering into an alliance with the Romans. In his time, one Magas, the governor of Libya and Cyrene, revolted; and held those provinces as an independent prince, notwithstanding the utmost efforts of Ptolemy to reduce him. At last an accommodation took place; and a marriage was proposed between Berenice, the only daughter of Magas, and Ptolemy's eldest son. The young princess was to receive all her father's dominions by way of dowry, and thus they would again be brought under the dominion of Ptolemy's family. But before this treaty could be put in execution, Magas died; and then Apamea, the princess's mother, did all she could to prevent the match. This, however, she was not able to do; the her efforts for that purpose produced a destructive war of four years continuance with Antiochus Theus king of Syria, and the acting of a cruel tragedy in the family of the latter. See Syria.

About 246 years before Christ, Ptolemy Philadelphus died; and was succeeded by his eldest son Ptolemy Euergetes, a my, who had been married to Berenice the daughter of Magas, as above related. In the beginning of his reign, he found himself engaged in a war with Antiochus Theus king of Syria. From this he returned victorious and brought with him 2500 statues and pictures, among which were many of the ancient Egyptian idols, which had been carried away by Cambyses into Persia. Those were restored by Ptolemy to their ancient temples: in memory of which favour, the Egyptians gave him the surname of Euergetes, or the Beneficent. In this expedition he greatly enlarged his dominions, making himself master of all the countries that lie between mount Taurus and the confines of India. An account of these conquests was given by himself, inscribed on a monument, to the following effect. "Ptolemy Euergetes, having received from his father the sovereignty of Egypt, Libya, Syria, Phænice, Cyprus, Lycia, Caria, and the other Cyclades, assembled a mighty army of horse and foot, with a great fleet, and elephants, out of Troglodita and Ethiopia; some of which had been taken by his father, and the rest by himself, and brought from thence, and trained up for war; with this great force he failed into Asia, and having conquered all the provinces which lie on this side the Euphrates, Cilicia, Pamphylia, Ionia, the Hellepont,
at court; and being now unable to bear the disfavour which prevailed there, he pressed Philopater to give him the assistance he had promised for restoring him to the throne of Sparta. This he the rather insisted upon, because he had received advice that Antigonus king of Macedon was dead, that the Achaeans were engaged in a war with the Etolians, and that the Lacedaemonians had joined the latter against the Achaeans and Macedonians. Ptolemy, when afraid of his brother Magas, had indeed promised to assist the king of Sparta with a powerful fleet, hoping by this means to attach him to his own interest; but now when Magas was out of the way, it was determined by the king, or rather his ministers, that Cleomenes should not be assisted, nor even allowed to leave the kingdom; and this extravagant resolution produced the desperate attempts of Cleomenes, of which an account is given in the history of Sparta.

Of the disorders which now ensued in the government, Antiochus king of Syria, surnamed the Great, took the advantage, and attempted to wrest from Ptolemy the provinces of Cilicia-Syria and Palestine. But in this he was finally disappointed, and not only have been totally driven out of Syria, but Ptolemy been too much taken up with his debaucheries to think of carrying on the war. The different occasioned by this piece of negligence soon produced a civil war in his dominions, and the whole kingdom continued in the utmost confusion till his death, which happened in the 17th year of his reign and 37th of his age.

During the reign of Philopater happened a very extraordinary event with regard to the Jews, which is mentioned in the Maccabees. The king of Egypt, concerning the Jews, while on his Syrian expedition, had attempted to enter the temple of Jerusalem; but being hindered by the Jews, he was filled with the utmost rage against the whole nation. On his return to Alexandria, he resolved to make those who dwelt in that city feel the first effects of his vengeance. He began with publishing a decree, which he caused to be engraved on a pillar erected for that purpose at the gate of his palace, excluding all those who did not sacrifice to the gods worshipped by the king. By this means the Jews were debarred from suing to him for justice, or obtaining his protection when they happened to stand in need of it. By the favour of Alexander the Great, Ptolemy Soter and Euergetes, the Jews enjoyed at Alexandria the fame privileges with the Macedonians. In that metropolis the inhabitants were divided into three ranks or classes. In the first were the Macedonians, or original founders of the city, and along with them were enrolled the Jews; in the second were the mercenaries who had served under Alexander; and in the third the native Egyptians. Ptolemy now, to be revenged of the Jews, ordered, by another decree, that they should be degraded from the first rank, and enrolled among the native Egyptians. By the same decree it was enacted, that all of that nation should appear at an appointed time before the proper officers, in order to be enrolled among the common people; that at the time of their enrollment they should have the mark of an ivy leaf, the badge of Bacchus, impressed with a hot iron on their faces; that all who were thus marked should be made slaves; and, lastly, that if any one should stand out against this decree, he should be immediately
immediately put to death. That he might not, however, be an enemy to the whole nation, he declared, that those who sacrificed to his gods should enjoy their former privileges, and remain in the same class. Yet, notwithstanding this tempting offer, 300 only out of many thousand Jews who lived in Alexandria could be prevailed upon to abandon their religion in order to save themselves from slavery.

The apostates were immediately excommunicated by their brethren; and this their enemies continued as done in opposition to the king's order; which threw the tyrant into such a rage, that he resolved to extirpate the whole nation, beginning with the Jews who lived in Alexandria and other cities of Egypt, and proceeding from thence to Jaffa and Jerusalem itself. In consequence of this cruel resolution, he commanded all the Jews that lived in any part of Egypt to be brought in chains to Alexandria, and there to be put up in the Hippodrome, which was a very spacious place without the city, where the people used to assemble to see horse-races and other public diversions. He then sent for Herman master of the elephants; and commanded him to have 500 of these animals ready against the next day, to let loose upon the Jews in the Hippodrome. But when the elephants were prepared for the execution, and the people were assembled in great crowds to see it, they were for that day disappointed by the king's absence. For, having been late up the night before with some of his debauched companions, he did not awake till the time for the festival was over, and the spectators returned home. He therefore ordered one of his servants to call him early on the following day, that the people might not meet with a second disappointment. But when the person awakened him according to his order, the king was not yet returned to his senses; having withdrawn, exceedingly drunk, only a short time before. As he did not remember the order, he therefore fell into a violent passion, and threatened with death the servant who had awakened him; and this caused the fleet to be put off till the third day. At last the king came to the Hippodrome attended with a vast multitude of spectators; but when he saw the elephants, instead of falling upon the Jews, they turned their rage against the spectators and soldiers, and destroyed great numbers of them. At the same time, some frightful appearances which were seen in the air so terrified the king, that he commanded the Jews to be immediately set at liberty, and restored them to their former privileges. No sooner were they delivered from this danger than they demanded leave to put to death such of their nation as had abandoned their religion; and this being granted, they dispatched the apostates without excepting a single man.

Philopater was succeeded by Ptolemy Epiphanes; and he, after a reign of 24 years, by Ptolemy Philometor. In the beginning of his reign, a war commenced with the king of Syria, who had seized on the provinces of Coele-Syria and Palestine in the preceding reign. In the course of this war, Philometor was either voluntarily delivered up to Antiochus or taken prisoner. But however this was, the Alexandrians despairing of his ever being able to recover his liberty, raised to the throne his brother Ptolemy, who took the name of Euphrates II. but was afterwards called Ptolemy, or "the great-bellied," on account of the prominent belly which his gluttony and luxury he had acquired. He was fierce seated on the throne, however, Philometor when Antiochus Epiphanes, returning into Egypt, restored, drove out Ptolemy, and referred the whole kingdom, and reigns except Pelopon, to Philometor. His design was to kindle a war between the two brothers, so that he might have an opportunity of seizing the kingdom for himself. For this reason he kept to himself the city of Pelopon; which being the key of Egypt, he might at his pleasure enter the country. But Philometor, apprised of his design, invited his brother Phycnon to an accommodation; which was happily effected by their sister Cleopatra. In virtue of this agreement, the brothers were to reign jointly, and to oppose to the utmost of their power Antiochus, whom they considered as a common enemy. On this the king of Syria invaded Egypt with a mighty army, but was prevented by the Romans from conquering it.

The two brothers were no sooner freed from the apprehensions of a foreign enemy than they began to quarrel with each other. Their differences soon came to such a height, that the Roman senate interposed. But before the ambassadors employed to inquire into the merits of the cause could arrive in Egypt, Phycnon had driven Philometor from the throne, and obliged him to quit the kingdom. On this he determed prince fled to Rome, where he appeared meanly dressed, and without attendants. He was very kindly received by the senate, who were so well satisfied of the injustice done him, that they immediately decreed his restoration. He was reconduced accordingly, and on the arrival of the ambassadors in Egypt, an accommodation between the two brothers was negociated. By this agreement, Phycnon was put in possession of Libya and Cyrene, and Philometor of all Egypt and the island of Cyprus; each of them being declared independent of the other in the dominion allotted to them. The treaty, as usual, was confirmed with oaths and sacrifices, and was broken almost as soon as made. Phycnon was dissatisfied with his share of the dominions; and therefore sent ambassadors to Rome, desiring that the island of Cyprus might be added to his other possessions. This could not be obtained by the ambassadors; and therefore Phycnon went to Rome in person. His Hand of demand was evidently unjust; but the Roman senate, on account of Cyprus adhering that it was their interest to weaken the power of Egypt as much as possible, without further ceremony adjudged the island to him.

Phycnon set out from Rome with two ambassadors; and arriving in Greece on his way to Cyprus, he raised there a great number of mercenaries, with a design to fall immediately to that island and conquer it. But the Roman ambassadors telling him, that they were commanded to put him in possession of it by fair means and not by force, he dismissed his army, and returned to Libya, while one of the ambassadors proceeded to Alexandria. Their design was to bring the two brothers to an interview on the frontier of their dominions, and there to settle matters in an amicable manner. But the ambassador who went to Alexandria, found Phycnon very averse from compliance with the decree of the senate. He put off the ambassador so long, that Phycnon sent the other also to Alexandria, hoping that the joint persuasions of the two would induce
Philemon refused to comply. But the king, after entertaining them at an immense charge for 40 days, at last plainly refused to submit, and told the ambassadors that he was resolved to adhere to the first treaty. With this answer the Roman ambassadors departed, and were followed by others from the two brothers. The senate, however, not only confirmed their decree in favor of Phylus, but renounced their alliance with Philemon, and commanded his ambassador to leave the city in five days.

In the mean time, the inhabitants of Cyrene having heard unfavourable accounts of Phylus’s behaviour during the short time he reigned in Alexandria, conceived so strong an aversion against him, that they resolved to keep him out of their country by force of arms. On receiving intelligence of this resolution, Phylus dropped all thoughts of Cyprus for the present; and hastened with all his forces to Cyrene, where he soon got the better of his rebellious subjects, and established himself in the kingdom. His vicious and tyrannical conduct, however, soon enraged from him the minds of his subjects, in such a manner, that some of them entering into a conspiracy against him, fell upon him one night as he was returning to his palace, wounded him in several places, and left him for dead only a prelude to the cruelties which he afterwards inflicted on his subjects. He divorced her; and, on the very day of his marriage with Cleopatra, and, on the very day of the nuptials, murdered her son in her arms. This was only a prelude to the cruelties which he afterwards practised on his subjects. He was no sooner seated on the throne, than he put to death all those who had shown any concern for the murder of the young prince. He then wreaked his fury on the Jews, whom he treated more like slaves than subjects, on account of their having favoured the cause of Cleopatra. His own people were treated with little more ceremony. Numbers of them were every day put to death for the smallest faults, and often for no fault at all, but merely to gratify his inhuman temper. His cruelty towards the Alexandrians is particularly mentioned under the article Alexandria. In a short time, he was wearied of his queen, who was also his sister, he divorced her; and married her daughter, who was also called Cleopatra, and whom he had previously ravished. In short, his behaviour was so exceedingly wicked, that it soon began to cry quite intolerable to his subjects; and he was obliged to fly to the island of Cyprus with his new queen, and Memphites, a son he had by her mother.

On the flight of the king, the divorced queen was placed on the throne by the Alexandrians; but Phylus, fearing left a son whom he had left behind should be appointed king, sent for him into Cyprus, and caused him to be assassinated as soon as he landed. This provoked the people against him to such a degree, that they pulled down and dashed to pieces all the statues which had been erected to him in Alexandria. This the tyrant supposed to have been done at the instigation of the queen, and therefore resolved to revenge it on her by killing his son whom he had by her. He therefore, without the least remorse, caused the young prince’s throat to be cut; and having put his mangled limbs into a box, sent them as a present to his mother Cleopatra. The messenger with whom this box was sent, was one of his guards. He was ordered to wait till the queen’s birth-day, which approached, and was to be celebrated with extraordinary pomp; and in the midst of the general rejoicing, he was to deliver the present. The horror and detestation occasioned by this unprecedented piece of cruelty cannot be expressed. An army...
During these disturbances, Apion king of Cyrenaica, the son of Ptolemy Philcon by a concubine, having maintained peace and tranquillity in his dominions during a reign of 21 years, died, and by his will left bequeathed his kingdom to the Romans; and thus the Egyptian to the Roman empire was considerably reduced and circumscribed.

Lathyrus being now delivered from all competitors, turned his arms against the city of Thebes, which had revoluted from him. The king marched in person, punished against the rebels; and, having defeated them in a pitched battle, laid close siege to their city. The inhabitants defended themselves with great resolution for three years. At last, however, they were obliged to submit, and the city was given up to be plundered by the soldiery. They left every where the most melancholy monuments of their avarice and cruelty; so that Thebes, which till that time had been one of the most wealthy cities of Egypt, was now reduced so low that it never afterwards made any figure.

About 76 years before Christ, Ptolemy Lathyrus Alexander was succeeded by Alexander. He was the son of Ptolemy, the Ptolemy Alexander for whom Lathyrus had been driven out; and had met with many adventures. He was first sent by Cleopatra into the island of Cos, with a great sum of money, and all her jewels; as thinking that was the safest place where they could be kept. When Mithridates king of Pontus made himself master of that island, the inhabitants delivered up to him the young Egyptian prince, together with all the treasures. Mithridates gave him an education suitable to his birth; but he, not thinking himself safe with a prince who had shed the blood of his own children, fled to the camp of Sylla the Roman dictator, who was then making war in Asia. From that time he lived in the family of the Roman general, till news was brought to Rome of the death of Lathyrus. Sylla then sent him to Egypt to take possession of the throne. But, before his arrival, the Alexandrians had chosen Cleopatra for their sovereign. To compromise matters, however, it was agreed, that Ptolemy should marry her, and take her for his partner in the throne. This marriage was accordingly done; and 19 days after the marriage, Cleopatra the unhappy queen was murdered by her husband, who,according to her will for 15 years afterwards showed himself such a monster of wickedness, that a general insurrection at length ensued among his subjects, and he was obliged to fly to the protection of the Great King, who was carrying on the war against Mithridates king of Pontus. But Pompey refusing to concern himself in the matter, he retired to the city of Tyre, where he died some months after.

When he was forced to shut himself up in the city of Tyre, Alexander had sent ambassadors to Rome, in order to influence the senate in his favour. But, dy-...
the new
of the royal blood of Egypt. Cicero represented, that
such a notorious imposture would debase the majesty of the
Roman people, and involve them in endless wars and disputes; that the fruitful fields of Egypt would be a strong temptation to the avarice of the people, who would not overlook them on their being divided among them, and lastly, that by this means the bloody quarrels about the Agrarian laws would be revived. These reasons had some weight with the Senate; but what chiefly prevented them from feizing on Egypt at this time was, that they had lately taken possession of the kingdom of Bithynia in virtue of the will of Nicomedes, and of Cyrene and Libya by the will of Apion. They thought, therefore, that if they should, on the like pretence, take possession of the kingdom of Egypt, this might too much expose their design of setting up a kind of universal monarchy, and occasion a formidable combination against them.

Auletes, who was now raised to the throne by the Egyptians, is said to have surpassed all the kings that went before him in the effeminacy of his manners. The name Auletes, which signifies the flute-player, was given him because he piqued himself on his skill in performing upon that instrument, and was not ashamed even to contend for the prize in the public games. He took great pleasure in imitating the manners of the Bacchanals; dancing in a female dress, and in the same meaneares that they used during the solemnity of their good Bacchus; and hence he had the surname of the New Dionysus or Bacchus. As his title to the crown was disputable (he being only the son of a concubine), the first care of Auletes was to get himself acknowledged by the Romans, and declare their ally. This was obtained by applying to Julius Caesar, who was at that time consul, and immensely in debt. Caesar being glad of such an opportunity of raising money, made the king of Egypt pay pretty dear for his alliance. Six thousand talents, a sum equal to L. 1,162,500 Sterling, were paid partly to Caesar himself, and partly to Pompey, whose interest was necessary for obtaining the consent of the people. Though the revenues of Egypt amounted to twice this sum, yet Auletes found it impossible for him to raise it without severely taxing his subjects. This occasioned a general discontent; and while the people were almost ready to take up arms, a most unjust decree passed at Rome for feizing the island of Cyprus. When the Alexandrians heard of the intentions of the republic, they prevailed Auletes to demand that island as an ancient appendage of Egypt; and, in case of a refusal, to declare war against that haughty and imperious people, who, they now saw, though too late, aimed at nothing less than the sovereignty of the world. With this request the king refused to comply; upon which his subjects, already provoked beyond measure at the taxes with which they were loaded, flew to arms, and surrounded the palace. The king had the good luck to escape their fury, and immediately leaving Alexandria, set sail for Rome.

In his way to that city, he landed on the island of Rhodes, where the famous Cato at that time was, being on his way to Cyprus, to put the unjust decree of the Senate in execution. Auletes, desirous to confer with a man of his prudence, immediately sent to acquaint him with his arrival. He imagined, that, upon this notice, Cato would immediately come and wait upon him; but the proud Roman told the messenger, that if the king of Egypt had any thing to say to Cato, he might, if he thought proper, come to his house. Accordingly the king went to pay him a visit; but was received with very little ceremony by Cato, who did not even vouchsafe to rise out of his seat when he came into his presence. When Auletes had laid his affairs before this haughty republican, he was blamed by him for leaving Egypt, the richest kingdom in the world, in order to expose himself, as he said, to the indignities he would meet with at Rome. There Cato told him, that nothing was in request but wealth and grandeur. All the riches of Egypt, he said, would not be sufficient to satisfy the avarice of the leading men in Rome. He therefore advised him to return to Egypt; and strive, by a more equitable conduct, to regain the affections of this people. He even offered to reconcile him thither, and employ his good offices in his behalf. But though Ptolemy was sensible of the propriety of this advice, the friends he had with him dissuaded him from following it, and accordingly he set out for Rome.

On his arrival in this metropolis, the king found, to his great concern, that Caesar, in whom he placed his conduct of greatest confidence, was then in Gaul. He was received, however, by Pompey with great kindness. He assigned him an apartment in his own house, and omitted nothing that lay in his power to serve him. But, notwithstanding the protection of so powerful a man, Auletes was forced to go from house to house like a private person, soliciting the votes of the senators. After he had spent immense treasures in procuring a strong party in the city, he was at last permitted to lay his complaints before the Senate; and at the same time there arrived and embassied from the Alexandrians, consisting of 100 citizens, to acquainted the Senate with the reasons of their revolt.

When Auletes first set out for Rome, the Alexandrians, not knowing what was to become of him, placed on the throne his daughter Berenice; and sent an embassy into Syria to Antiochus Attaliscus, inviting him into Egypt to marry the queen, and reign in partnership with her. Antiochus was dead before the arrival of the ambassadors: upon which the same proposal was made to his brother Seleucus, who readily accepted it. This Seleucus is described by Strabo as monstrously deformed in body, and filled more so in mind. The Egyptians nicknamed him Cybiusfatis, or the Scollion; a name which seemed more fit for him than any other. He was fierce and violent on the throne, when he gave a signal influence of his forrid and avaricious temper. Ptolemy the first had caused the body of Alexander the Great to be deposited in a coffin of maffy gold. This the king feized upon; and by that means provoked his wife Berenice to such a degree, that she caused him to be murdered. She then married one Archelaus, high priest of Comana in Pontus, who pretended to be the son of Mithridates the Great; but was, in fact, only the son of that monarch's general.

Auletes was not a little alarmed on hearing of these transactions, especially when the ambassadors arrived, who he feared would overturn all the schemes he had laboured so much to bring about. The embassy was headed by one Dion, a celebrated academic philosopher, who
who had many powerful friends at Rome. But Ptolemy found means to get both him and most of his followers assassinated; and this intimidated the reft to such a degree, that they durst not execute their commiitment, or, for some time, even demand justice for the murder of their colleagues.

The report of so many murders, however, at last spread a general alarm. Auletes, fire of the protection of Pompey, did not scruple to own himself the perpetrator of them. Nay, though an action was commenced against one Actius an affaflin who had stabbed Dion the chief of the embassy abovementioned, and the crime was fully proved; yet he was acquitted by the venal judges, who had all been bribed by Ptolemy. In a short time, the Senate passed a decree, by which it was enacted, that the king of Egypt should be restored by force of arms. All the great men in Rome were ambitious of this commiitment; which, they well knew, would be attended with immense profit. Their counsels on this occasion took up a considerable time; and at last a prophecy of the Sybil was found out, which forbade the afflating an Egyptian monarch with an army. Ptolemy, therefore, wearied out with so long a delay, retired from Rome, where he had made himself generally odious, to the temple of Diana at Ephesus, there to wait the decision of his fate. Here he remained a considerable time: but as he saw that the Senate came to no resolution, tho' he had solicited them by letters to do so; at last, by Pompey's advice, he applied to Gabinius the proconsul of Syria. This Gabinius was a man of a molt infamous character, and ready to undertake any thing for money. Therefore, though it was contrary to an express law for any governor to go out of his province, without positive orders from the Senate and people of Rome, yet Gabinius ventured to transgress this law, upon condition of being well paid for his pains. As a recompence for his trouble, however, he demanded 10,000 talents; that is, L. 1,927,500 Sterling. Ptolemy, glad to be restored on any terms, agreed to pay the abovementioned sum; but Gabinius would not stir till he had received one half of it. This obliged the king to borrow it from a Roman knight named Caius Rabirius Posthumus; Pompey interposing his credit and authority for the payment of the capital sums. Gabinius now set out for Egypt, attended by the famous Mark Anthony, who at this time served in the army under him. He was met by Archelaus, who since the departure of Auletes had reigned in Egypt jointly with Berenice, at the head of a numerous army. The Egyptians were utterly defeated, and Archelaus taken prisoner in the first engagement. Thus Gabinius might have put an end to the war at once; but his avarice prompted him to diminish Archelaus on his paying a considerable ransom; after which, pretending that he made his escape, fresh sums were demanded from Ptolemy for defraying the expences of the war. For these sums Ptolemy was again obliged to apply to Rabirius, who lent him what money he wanted at a very high interest. At last, however, Archelaus was defeated and killed, and thus Ptolemy again became master of all Egypt.

No sooner was Auletes firmly settled on the throne, than he put to death his daughter Berenice, and oppressed his people with the most cruel exactions, in order to procure the money he had been obliged to bor-
The new khalif succeeded to the throne at the age of 21; and committed the management of affairs entirely to the care of Jawhar, his father's long experienced general and prime minister. In 978, he sent this famous warrior to drive out Al Aftekin, the emir of Damascus. The Egyptian general accordingly formed the siege of that place; but at the end of two months, was obliged to raise it, on the approach of an army of Karmatians under the command of Al Hakem.

As Jawhar was not strong enough to venture an engagement with these Karmatians, it was impossible for him to hinder them from effecting a junction with the forces of Al Aftekin. He therefore returned, or rather fled, towards Egypt with the utmost expedition; but being overtaken by the two confederate armies, he was soon reduced to the last extremity. He was, however, permitted to resume his march, on condition that he yielded under Al Aftekin's sword and Al Hakem's lance; and to this disgraceful condition Jawhar found himself obliged to submit. On his arrival in Egypt, he immediately advised Al Aziz to undertake an expedition in person into the east, against the combined army of Turks, Karmatians, and Damascenes, under the command of Al Aftekin and Al Hakem. The khalif followed his advice; and advancing against his enemies, overthrew them with great slaughter. Al Aftekin himself escaped out of the battle; but was afterwards taken and brought to Al Aziz, who made him his chamberlain, and treated him with great kindness.

Jawhar, in the mean time, was disgraced on account of his bad success; and in this disgrace he continued till his death, which happened in the year of our Lord 990, and of the Hegira 381.

This year Al Aziz having received advice of the Aleppo beheaded of Saado'dawla prince of Aleppo, sent a formidable army under the command of a general named Manjubekin, to reduce that place. Lulu, who had been appointed guardian to Saado'dawla's son, finding himself pressed by the Egyptians, who carried on the siege with great vigour, demanded assistance from the Greek emperor. Accordingly, he ordered a body of troops to advance to Lulu's relief. Manjubekin, being informed of their approach, immediately raised the siege, and advanced to give them battle. An obstinate engagement ensued, in which the Greeks were at last overthrown with great slaughter. After this victory, Manjubekin pushed on the siege of Aleppo very briskly; but finding the place capable of defending itself much longer than he at first imagined, and his provisions beginning to fail, he raised the siege.

The khalif upon this sent him a very threatening letter, and commanded him to return before Aleppo. He did so; and continued the siege for 13 months; during all which time it was defended by Lulu with incredible bravery. At last, the Egyptians hearing that a numerous army of Greeks was on their way to relieve the city, they raised the siege, and fled with the utmost precipitation. The Greeks then took and plundered some of the cities which Al Aziz possessed in Syria; and Manjubekin made the best of his way to Damascus, where he set up for himself. Al Aziz being informed of this revolt, marched in person against him with a considerable army; but being taken ill by the way, he expired, in the 21st year of his reign and 42d of his age.

Al Aziz was succeeded by his son Abi Al Manfur, surnamed Al Hakem; who, being only 11 years of age, was put under the tuition of an eunuch of approved integrity.

This reign is remarkable for nothing so much as the strange madness with which the khalif was seized in the latter part of it. This manifested itself first by his issuing many preposterous edicts; but at length grew to such
Egypt. a height, that he fancied himself a god, and found no fewer than 16,000 persons who owned him as such. These were mostly the Dararians, a new sect sprung up about this time, who were so called from their chief, Mahommed Ebn Ihmael, surnamed Darari. He is supposed to have inspired the mad khalif with this impius notion; and, as Darari set up for a second Moles, he did not interfere to alert that Al Hakem was the great Creator of the universe. For this reason, a zealous Turk flabled him in the khalif's chariot. His death was followed by a three days uproar in the city of Cairo; during which, Darari's house was pulled down, and many of his followers massacred. The sect, however, did not expire with its author. He left behind him a disciple named Hama, who, being encouraged by the mad khalif, spread it far and wide through his dominions. This was quickly followed by an abrogation of all the Mahometan tafs, festivals, and pilgrimages, the grand one to Mecca in particular; so that the zealous Mahometans were now greatly alarmed, as justly supposing that Al Hakem designed entirely to suppress the worship of the true God, and introduce his own in its place. From this apprehension, they were delivered by the death of the khalif; who was assassinated, by a contrivance of his own sifter, in the year 1020.

Al Hakem was succeeded by his son Al Thaher, who reigned 15 years; and left the throne to a fon under seven years of age, named Al Moftanfer Billah.—

In the year 1041, a revolt happened in Syria; but Al Moftanfer having sent a powerful army into that country, under the command of one Aushberek, he not only reduced the rebels, but considerably enlarged the Egyptian dominions in Syria.

In 1054, a Turk named Al Baffafiri, having quarreled with the vizir Al Kayem khalif of Bagdad, fled to Egypt, and put himself under the protection of Al Moftanfer. The latter, imagining this would be a favourable opportunity for enlarging his dominions, and perhaps seizing on the city of Bagdad, supplied Baffafiri with money and troops. By this affiance, he was enabled to possess himself of Arabia Irak, and ravaged that province to the very gates of Bagdad. On this, Al Kayem wrote to Togrol Beg, or Tangrolipix, the Turkish sultan, who possessed very extensive dominions in the east, to come to his assistance. The sultan immediately complied with his request, and soon arrived at Bagdad with an formidable army and 18 elephants. Of this Baffafiri gave notice to Al Moftanfer, and intreated him to exert himself further for his support against so powerful an enemy. This was accordingly done, but nothing worthy of notice happened till the year 1058. At this time Baffafiri having found means to excite Ibrahim the sultan's brother to a revolt, Togrol Beg was obliged to employ all his force against him. This gave Baffafiri an opportunity of seizing on the city of Bagdad itself: and the unfortunate khalif, according to fome, was taken prisoner, or, according to others, fled out of the city. Baffafiri, on his entry, caufed Al Moftanfer to be immediately proclaimed khalif in all quarters of the city. Al Kayem's vizir had orders to be led on a camel through the streets of Bagdad, drested in a woollen cloak, with a high red bonnet, and a leathern collar about his neck; a man fufhing him all the way behind. Then being fewed up in a bull's hide, with the horns placed over his head, and hung upon hooks, he was beheaded without ceasing till he died. The imperial palace was plundered, and the khalif himfelf detained a clofe prisoner.

This success was but short-lived; for, in 1059, To- grol Beg defeated his brother Ibrahim, took him prisoner, and treangled him with a bow-string. He then marched to Bagdad, which Baffafiri thought it necessary to abandon at his approach. Here the khalif Al Kayem was delivered up by Mahras, the governor of a city called Hadatha, who had the charge of him. The khalif was immediately restored to his dignity; which Baffafiri no fonner understood, than he again advanced towards the city. Against him Togrol Beg sent a part of his army under fome of his generals, while he himself followed with the refi. A battle ensued, in which the army of Baffafiri was defeated, and he him­self killed. His head was brought to Togrol Beg, who caufed it to be carried on a pike through the streets of Bagdad.

Thus the hopes of Al Moftanfer were entirely frownd. Decline of the city was the foon afterwards, and from this period we may date the decline of the Egyptian empire under the khalifs. The Egyptian empire had made themselves masters of almost all Syria; but no fonner was Baffafiri's bad fuccefs known, than the younger part of the citizens of Aleppo revolted, and set up Mahomud Azzo'dawla, who immediately laid siege to the citadel. Al Moftanfer fent a powerful army against him, which Azzo'dawla entirely defeated, and took the general himself-prifoner; and soon after this, he made himself master both of the city and citadel, with all their dependencies. In his new dominions he behaved with the greatest cruelty, destroying every thing with fire and fword, and making frequent incursions into the neighbouring provinces, which he treated in the fame manner.

This disaster was soon followed by others ftil more terrible. In 1066, a famine raged over all Egypt and Syria, with fuch fury, that dogs and cats were fed for four or five Egyptian dinars each, and other provisions in proportion. Multitudes of people died in Cairo for want of food. Nay, fo great was the scarcity, that the vizir had but one servant left who was able to attend him to the khalif's palace, and to whom he gave the care of his horfe when he alighted at the gate. But, at his return, he was surprifed to find that the horfe had been carried off, killed, and eaten by the famished people. Of this he complained to the khalif; who caufed three of them who carried off the horfe to be hanged. Next day, however, he was still more for­prifed to hear, that all the flefh had been picked off the bones of the three unhappy criminals, fo that nothing but the skeletons were left. And to fuch a degree of misery were the inhabitants, not only in Cairo but through all Egypt, reduced, that the carcasses of tho­se who died were fed for food at a great price, instead of being buried. All this time the khalif showed the greatest kindness and beneficence towards his unhappy fubje&ts, infomuch that of 10,000 horses, mules, and camels, which he had in his stables when the famine began, he had only three left when it was removed. This famine lasted a plagu,; and this by In vasion of the Turks under Abu Ali Hafan the Turks. Naferod'dawla the very general who had been fenl a­gainst
gainst the rebel Azzo'dawla and defeated by him. He began with besieging the khalif in his own palace; and the unhappy prince, being in no condition to make resistance, was obliged to buy himself off at the expense of every thing valuable that was left in his exhausted capital and treasury. This, however, did not hinder these merciless plunderers from ravaging all the Lower Egypt from Cairo to Alexandria, and committing the most horrid cruelties through that whole tract. —This happened in the years 1067 and 1068; and in 1069 and 1070, there happened two other revolts in Syria; so that this country was now almost entirely lost.

In 1095 died the khalif Al Moftanfer, having reigned 60 years; and was succeeded by his son Abul Kafem, famneled Al Moftal.—The most remarkable transfiguration of this prince's reign, was his taking the city of Jerusalem from the Turks in 1098; but this success was only of short duration; for it was, the same year, taken by the crusaders.

From this time to the year 1164, the Egyptian history is more than an account of the interfing broils and contests between the vizirs or prime ministers, who were now become so powerful, that they had in a great measure stripped the khalifs of their civil power, and left them nothing but a shadow of spiritual dignity. These contests at last gave occasion to a revolution, by which the race of Fatemite khalifs was totally extinguished. This revolution was accomplished in the following manner.—One Shawer, having overcome all his competitors, became vizir to Al Abed, the eleventh khalif of Egypt. He had not been long in possession of this office, when Al Dargam, an officer of rank, endeavoured to deprive him of it. Both parties quickly had recourse to arms; and a battle ensued, in which Shawer was defeated, and obliged to fly to Nuroddin prince of Syria, by whom he was graciously received, and who promised to reinstate him in his office of vizir. As an inducement to Nuroddin to assist him more powerfully, Shawer told him that the crusaders had landed in Egypt, and made a considerable progress in the conquest of it; that he promised also, that, in case he was reinstated in his office, he would pay Nuroddin annually the third part of the revenues of Egypt; and would, besides, defray the whole expense of the expedition.

As Nuroddin bore an implacable hatred to the Christians, he readily undertook an expedition againsth them, for which he was to be so well paid. He therefore sent an army into Egypt under the command of Shawer and a general named Afaoddin. Dargam, in the mean time, had cut off so many generals whom he had imagined favourable to Shawer's interest, that he thereby weakened the military force of the kingdom, and in a great measure deprived himself of the power of resistance. He was therefore easily overthrown by Afaoddin, and Shawer reinstated in the office of vizir. The faithful minister, however, no sooner saw himself firmly established in his office, than he refused to fulfil his engagements to Nuroddin by paying the stipulated sums. Upon this, Afaoddin seized Pelusium and some other cities. Shawer then entered into an alliance with the crusaders, and Afaoddin was besieged by their combined forces in Pelusium. Nuroddin, however, having invaded the Christian dominions in Syria, and taken a strong fortress called Harém, Shawer and his confederates thought proper to hearken to some terms of accommodation, and Afaoddin was permitted to depart for Syria.

In the mean time, Nuroddin, having subdued the greatest part of Syria and Melopomedia, resolved to make Shawer feel the weight of his remittance, on account of his perfidious conduct. He therefore sent back Afaoddin into Egypt with a sufficient force, to compel Shawer to fulfill his engagements: but this the vizir took care to do before the arrival of Afaoddin; and thus, for the present, avoided the danger. It was not long, however, before he gave Nuroddin fresh occasion to send this general against him. That prince had now driven the crusaders almost entirely out of Syria, but was greatly alarmed at their progress in Egypt; and consequently offended at the alliance which Shawer had concluded with them, and which he still perilled in observing. This treaty was also thought to be contrived on purpose to prevent Shawer from being able to fulfil his promise to Nuroddin, of sending him annually a third part of the revenues of Egypt. Nuroddin therefore dispatched Afaoddin into Egypt, in the year 1166, with a sufficient force, and attended by the famous Salahaddin, or Saladin, his own nephew. They entered the kingdom without opposition, and totally defeated Shawer and the crusaders. They next made themselves masters of Alexandria; and, after that over-ran all the Upper Egypt. Saladin was left with a considerable garrison in Alexandria; but Afaoddin was no sooner gone, than the crusaders laid siege to that city. At last obliged Afaoddin to return to its relief. The great loaves he had sustained in this expedition probably occasioned his agreeing to a treaty— with Shawer, by which he engaged to retire out of Egypt, upon being paid a sum of money.

Afaoddin was no sooner gone, than Shawer entered into a fresh treaty with the Franks. By this new alliance he was to attack Nuroddin in his own dominions, as he was at that time engaged in quelling some revolts, which would effectually prevent his sending any more forces into Egypt. This treaty provoked the Syrian prince, that he resolved to suspend his other conquests for some time, and exert his whole strength in the conquest of Egypt.

By this time the crusaders had reduced Pelusium, Conquefts made a considerable progress in the kingdom, as of the crusaders, well as in some other countries, through the divisions faders, which reigned among the Mahometan princes. In such places as they conquered, they put almost every body to the sword, Christians as well Mahometans; selling their prisoners for slaves, and giving up the towns to be plundered by the soldiers. From Pelusium they marched to Cairo; which was then in no posture of defence, and in the utmost confusion, by reason of the divisions which reigned in it. Shawer, therefore, as soon as he heard of their approach, caused the ancient quarter called Misr to be set on fire, and the inhabitants to retire into the other parts. He also prevailed upon the khalif to solicit the assent of Nuroddin; which the latter was indeed very much inclined of himself to grant, as it gave him the fairest opportunity he could have wished for, both of driving the crusaders out of Egypt, and of seizing the king-
They are repulsed by the army of Nuroddin prince of Damascus. 

The army of Nuroddin now approached the capital by hasty marches, and were every where received with the greatest demonstrations of joy. Nuroddin, on his arrival at Cairo, was invited by Al Ated to the royal palace, where he was entertained in the most magnificent manner, and received several presents; nor were Saladin's Ayub, who was a consummate politician, and very ambitious of seeing his son raised to the throne of Egypt. They therefore advised Saladin to continue steadfast in his resolutions; and, whilst he amused Nuroddin with feigned submissions, to take every method in his power to secure himself in the possession of so valuable a kingdom. Nuroddin himself, however, was too great a master in the art of dissimulation to be easily imposed on by others: and therefore, though he pretended to be well pleased with Saladin's conduct, he was all this time raising a powerful army, with which he was fully determined to invade Egypt the following year. But while he mediated this expedition, he was feized with a quaffy at the castle of Damascus, which put an end to his life, in the year 1173.

Saladin, though now freed from the apprehensions of such a formidable enemy, dared not venture to assume the title of Sovereign, while he saw the succesor of Nuroddin at the head of a very powerful army, and had already given some signal proofs of his valour and conduct. What determined the khalif to prefer him to all the rest is not known; but it is certain that some of them were highly displeased with his promotion, and even publicly declared that they would not obey him. In order to gain the support of his uncle; by which means, and a strong garrison he had placed in the castle of Cairo, his power became firmly established. Though he had not the least intention of continuing in his allegiance to Nuroddin, he did not think it prudent at first to declare himself. He sent for his father, however, and the rest of his family, who were in Nuroddin's dominions, in order, as he said, to make them partakers of his grandeur and happiness. Nuroddin did not think proper to deny this request; though, being already jealous of the great power of Saladin, he insisted that his family should consider him only as one of his generals in Egypt.

A good understanding subsisted between Nuroddin and Saladin for some time, which did not a little contribute to raise the credit of the latter with the Egyptians. In 1169, Nuroddin sent him orders to omit the name of Al Ated, the khalif of Egypt, in the public prayers, and substitute that of the khalif of Bagdad in its place. This was at any rate a dangerous at-

temp; as it might very readily produce a revolt in favour of Al Ated; or if it did not, it gave Saladin an opportunity of engrooving even that small remnant of power which was left to the khalif. Al Ated, however, was not sensible of his disgrace; for he was on his death-bed, and past recovery, when Nuroddin's orders were executed. After his death, Saladin feized on seizing the all his wealth and valuable effects; which consisted of effects of jewels of prodigious size, sumptuous furniture, a library, and the khalif's palace. They are repulsed by the army of Nuroddin prince of Damascus. 

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93

Christians

totally
defeated.

Carac on his left. Then he drank to the former, who was at that time ready to expire with thirst, and at the same time offered him a cup of cold water. This was thankfully received; and the king immediately drank to the prince of Al Carac, who sat near him. But here Saladin interrupted him with some warmth: "I will not (says he) suffer this cursed rogue to drink; as that, according to the laudable and generous custom of the Arabs, would secure to him his life." Then, turning towards the prince, he reproached him with having undertaken the expedition while in alliance with himself, with having intercepted an Egyptian caravan in the time of profound peace, and massacring the people of which it was composed, &c. Notwithstanding all this, he told him, he would grant him his life, if he would embrace Mahometanism. This condition, however, was refused; and the sultan, with one stroke of his scimitar, cut off the prince's head. This greatly terrified the king of Jerusalem; but Saladin assured him he had nothing to fear, and that Arnold had brought on himself a violent death by his want of common honesty.

The crusaders being thus totally defeated and dispersed, Saladin next laid siege to Tiberias, which capitulated almost at once. Then he marched towards Acco or Ptolemais, which likewise surrendered after a short siege. Here he found 4000 Mahometan prisoners in chains, whom he immediately released. As the inhabitants enjoyed at present a very extensive trade, the place being full of merchants, he found there not only vast sums of money, but likewise a great variety of wares exceedingly valuable, all which he seized and applied to his own use. About the same time his brother Al Malek attacked and took a very strong fortress in the neighbourhood; after which the sultan divided his army into three bodies, that he might with the greater facility over-run the territories of the Christians. Thus, in a short time, he made himself master of Neapolis, Caesarea, Sepphoris, and other cities in the neighbourhood of the Jordan, where his soldiers found only women and children, the men having been all killed or taken prisoners. His next conquest was Joppa, which was taken by storm after a vigorous resistance. Everything being then settled, and a distribution made of the spoils and captives, Saladin marched in person against Tiberien, a strong fortress in the neighbourhood of Sidon; which was taken by assault, after it had sustained a siege of six days. No sooner was he master of this place, than he ordered the fortress to be razed, and the garrison put to the sword. From Tiberien the victorious sultan proceeded to Sidon itself; which, being deferted by its prince, surrendered almost at the first summons. Beirut was next invested, and surrendered in seven days. Among the prisoners Saladin found in this place the prince of a territory called Hobiel, who by way of ransom delivered up his dominions to him, and was of course released. About the same time, a Christian ship, in which was a nobleman of great courage and experience in war, arrived at the harbour of Ptolemais, not knowing that it was in the hands of Saladin. The governor might easily have secured the vessel; but neglecting the opportunity, he escaped to Tyre, where the above-mentioned nobleman, together with the prince of Hobiel, contributed not a little
Egypt

94

Jerusalem taken.

95

Crusaders retrieve their affairs.

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to retrieve the affairs of the Christians, and enable them to make a stand for four years after.

Saladin, in the mean time, was on with his conquests. Having made himself master of Acre after a siege of 14 days, he next invaded Jerusalem. The garrisons was numerous, and made a desperate stand; but Saladin, having at last made a breach in the walls by sapping, the besieged desired to capitulate. This was at first refused; upon which the Christian ambassador made the following speech: "If that be the case, know, O sultan, that we are extremely numerous, and have been restrained from fighting like men in despair only by the hopes of an honourable capitulation, will kill all our wives and children, commit all our wealth and valuable effects to the flames, massacre 5000 prisoners now in our hands, leave not a single beast of burden or animal of any kind belonging to us alive, and level with the ground the rock you esteem dearer than we are, or force you to abandon the siege." This desperate speech had such an effect upon Saladin, that he immediately called a council of war, at which all the general officers declared, that it would be most proper to allow the Christians to depart unmolested. The sultan therefore allowed them to march out freely and securely with their wives, children, and effects, after which he received ten dinars from every man capable of paying that sum, five from every woman, and two from every young person under age. For the poor who were not able to pay any thing, the rest of the inhabitants raised the sum of 30,000 dinars.

Most of the inhabitants of Jerusalem were escorted by a detachment of Saladin's troops to Tyre; and soon after, he advanced with his army against that place. As the port was blockaded by a squadron of five men of war, Saladin imagined that he should easily become master of it. But in this he found himself mistaken. For, one morning by break of day, a Christian fleet fell upon his squadron, and entirely defeated it; nor did a single vessel escape their pursuit. A considerable number of the Mahometans threw themselves into the sea during the engagement; most of whom were drowned, though some few escaped. About the same time Saladin himself was vigorously repulsed by land; so that, after calling a council of war, it was thought proper to raise the siege.

In 1288 Saladin, though his conquests were not so rapid and considerable as hitherto, continued still superior to his enemies. He reduced the city of Laodicea and some others, together with many strong castles; but met also with several repulsions. At last he took the road to Antioch; and having reduced all the fortresses that lay in his way, many of which had been deemed impregnable, Bohemond prince of Antioch was so much intimidated, that he declared a truce for seven or eight months. This Saladin found himself obliged to comply with; on account of the prodigious fages his men had sustained, and because his auxiliaries now demanded leave to return home.

All these heavy losses of the Christians, however, proved to their advantage, as they were thus obliged to lay aside their animosities, which had originally proved the ruin of their affairs. Tho'me who had defended Jerusalem, and most of the other fortresses taken by Saladin, having retreated to Tyre, formed there a very numerous body. This proved the means of preferring that city, and also of re-establishing their affairs for the present. For, having received powerful succours from Europe, they were enabled in 1139 to take the field with 30,000 foot and 2000 horse. Their first attempt was upon Alexandretta; from whence they diluged a strong party of Mahometans, and made themselves masters of the place with very little loss. They next laid siege to Ptolemais; of which Saladin had no sooner received intelligence, than he marched to the relief of the place. After several skirmishes with various successes, a general engagement ensued, in which Saladin was defeated with the loss of 10,000 men. This enabled the Christians to carry on the siege of Ptolemais with greater vigour; which place, however, they were not able to reduce for the space of two years.

This year the sultan was greatly alarmed by an account that the emperor of Germany was advancing to Conflantinople with an army of 260,000 men, in order to afflict the other crusaders. This prodigious armament, however, came to nothing. The multitude was so reduced with sickness, famine, and fatigue, that scarce 1000 of them reached the camp before Ptolemais. The siege of that city was continued, though with bad success on the part of the Christians. They were repulsed in all their attacks, their engines were burnt with naptha, and the beleaguered always received supplies of provisions in spite of the utmost efforts of the besiegers; at the same time that a dreadful famine and pestilence raged in the Christian camp, which sometimes carried off 200 people a-day.

In 1191, the Christians received powerful succours from Richard I. of England, Philip II. of France, and Richard I. of England (from his great courage known as "Cœur de Lion"), arrived before the camp at Ptolemais. The latter was effected the bravest and most enterprising of all the generals the crusaders had; and the spirits of his soldiers were greatly elated by the thoughts of acting under such an experienced commander. Soon after his arrival, the English sunk a Mahometan ship of vaft size, having on board 650 soldiers, a great quantity of arms and provisins, going from Berytus to Ptolemais. Of the soldiers and sailors who navigated this vessel, only a single person escaped; who being taken prisoner by the English, was dispatched to the sultan with the news of the disaster. The beleaguered still defended themselves with the greatest resolution; and the king of England happening to fall sick, the operations of the besiegers were considerably delayed. On his recovery, however, the attacks were renewed with such fury, that the place was every moment in danger of being taken by assault. This induced them to send a letter to Saladin, informing him, that if they did not receive succours the very next day, they would be obliged to submit. As this town was the sultan's principal magazine of arms, he was greatly affected with the account of their distress, especially as he found it impossible to relieve them. The inhabitants, therefore, found themselves under a necessity of surrendering the place. One of the terms of the capitulation, was that the crusaders should receive a very considerable sum of money from Saladin, in con-

consequence.
Roman pretorian bands, they turned their arms against their masters, and in 1260 deposed and murdered the khalif, as has been already related.

The Mamlouks having got possession of the government, and neither understanding nor putting a value upon any thing beside the art of war, every species of learning decayed in Egypt, and a great degree of barbarism was introduced. Neither was their empire of long duration notwithstanding all their martial abilities. The reason of this was, that they were originally only a small part of the sultan of Egypt'sstanding forces. As a numerous standing army was necessary in a country where the fundamental maxim of government was, that every native must be a slave, they were at first at a loss how to act; being justly suspicious of all the rest of the army. At last they resolved to buy Christian slaves, and educate them in the same way that themselves had formerly been. These were commonly brought from Circassia, where the people, though they professed Christianity, made no scruple of selling their children. When they were completed in their military education, these soldiers were disdosed of through all the fortresses erected in the country to bridle the inhabitants; and became in their language such a fort was called Borje, the new militia obtained the name of Borgites. By this expedient the Mamlouks imagined they would be able to secure themselves in the sovereignty. But in this they were mistaken. In process of time, the old Mamlouks grew proud, insolent, and lazy; and the Borgites, taking advantage of this, drove out the former masters, deprived them of the government by substitution, and transferred it to themselves about the year 1382.

The Borgites, as well as the former, assumed the name of Mamlouks; and were famous for their valour and ferocity of conduct. They were almost perpetually engaged in wars either foreign or domestic; and their dominion lasted till the year 1517, when they were invaded by Selim the Turkish sultan. The Mamlouks defended themselves with incredible valor; notwithstanding which, being overpowered by numbers, they were defeated in every engagement. The former capital, the city of Cairo, was taken, with a terrible slaughter of those who defended it. The sultan was forced to fly; and, having collected all his force, ventured a decisive battle. The most romantic efforts of valor, however, were insufficient to cope with the innumerable multitude which composed the Turkisharmy. Most of his men were cut in pieces, and the unhappy prince himself was at last obliged to take shelter in a tower. He was dragged from his hiding place, where he had fixed upon the shoulders in water, and soon after put to death. With him ended the glory, and almost the existence, of the Mamlouks, who were now everywhere searched for and cut to pieces.

This was the last great revolution in the Egyptian affairs; a revolution very little to the advantage of the natives, who may well doubt whether their ancient or modern conquerors have behavied with the greater degree of barbarity. Selim gave a specimen of his government, the very day after his being put in full possession of it by the death of Tuman Bey the unfortunate sultan abovementioned. Having ordered a theatre to be erected with a throne upon it on the banks of the Nile,
by Selim. His horrid cruelty.

Notwithstanding this horrid cruelty of Selim, he did not attempt the total extermination of the race of Mamlouks, though this would have been quite agreeable to the maxims of Turkish policy; but in the present case he seems to have recollected, that if he established a pasha in Egypt with the same powers with which he invested those of other parts, he would be under strong temptations to revolt by reason of the distance from the capital. He therefore proposed a new form of government, by which the power being distributed among the different members of the state, should preserve an equilibrium, so that the dependence of the whole should be upon himself. With this view, he chose from among the Mamlouks who had escaped the general massacre, a divan, or council of regency, consisting of the pacha and chiefs of the seven military corps. The former was to notify to this council the orders of the Porte, to send the tribute to Constantinople; and for the safety of government both external and internal; while, on the other hand, the members of the council had a right to reject the orders of the pacha, or even of depoiting him, provided they could align sufficient reasons. All civil and political ordinances must also be ratified by them. Besides this, he formed the whole body into a republic; for which purpose he issued an edict to the following purpose:

"Though, by the help of the Almighty, we have conquered the whole kingdom of Egypt with our invincible armies; nevertheless our benevolence is willing to grant to the 24 fangiacs (a) of Egypt a republican government, with the following conditions."

I. That our sovereignty shall be acknowledged by the republic; and in token of their obedience, our lieutenant shall be received as our representative: but to do nothing against our will or the republic; but, on the contrary, shall cooperate with it for its welfare on all occasions. Or if he shall attempt to infringe any of its privileges, the republic is at liberty to expel him from his authority, and to send to our Sublime Porte a complaint against him, &c.

II. In time of war, the republic shall provide 12,000 troops at its own expense, to be commanded by a fangiac or fangiacs.

III. The republic shall raise and send to our Sublime Porte the sum of 500,000 asliy (a) accompanied by a fangiac, who shall have a satisfactory receipt, &c.

IV. The same sum to be raised for the use of Medina, and Kiabe or Mecca.

V. No more troops or janizaries shall be kept by the republic in time of peace than 14,000; but in time of war they may be increased to oppose our and the republic's enemies.

VI. The republic shall send annually to our gratefulness, out of the produce of the country, one million of caiz (c) or measures of corn, viz. 600,000 of wheat and 200,000 of barley.

VII. The republic, fulfilling these articles, shall have a free government over all the inhabitants of Egypt, independent of our lieutenant; but shall execute the laws of the country with the advice of the mollah or high priest under our authority and that of our successors.

VIII. The republic shall be in possession of the mint as hereafter; but with this condition, that it shall be under the inspection of our lieutenant, that the coin may not be adulterated.

"IX. That the republic shall elect a sheik bellet out of the number of beys, to be confirmed by our lieutenant; and that the said sheik bellet shall be our representative, and shall be esteemed by all our lieutenants, and all our officers both of high and low rank, as the head of the republic; and if our lieutenant is guilty of oppression, or exceeds the bounds of his authority, the said sheik bellet shall represent the grievances of the republic to our Sublime Porte; but in case any foreign enemy or enemies disturb the peace of the republic, we and our successors engage to protect it with our utmost power until peace is re-established, without any cost or expense to the republic.

"Given and signed by our clemency to the republic of Egypt.

Thus the power of the Mamlouks still continued in a very considerable degree, and by degrees increased to such a power as to threaten a total loss of dominion to the Turks. During the last 50 years, the Porte having relaxed from its vigilance, such a revolution has taken place, that the Turkish power is now almost reduced to nothing. But in order to understand this, we must consider the way in which the race of Mamlouks is continued or multiplied in Egypt. This is not in the ordinary way, by marriage: on the contrary, M. Volney affirms, that "during 500 years in which there have been Mamlouks in Egypt, not one of them has left sufficient issue; all their children perished in the first or second defect. Almost the same thing holds good with regard to the Turks; and it is observed, that all Turks can only secure the continuance of their families by marrying women who are natives, which the Mamlouks are never allowed to do. The means by which they are perpetuated and multiplied are the same by which they were first established, viz. by slaves brought from their original country. From the time of the Moguls this commerce has been continued on the banks of the Cuban and Phasis in the same manner as it is carried on in Africa, by the wars among the hostile tribes, and the misery or avarice of the inhabitants, who sell their children to strangers. The slaves thus procured are first brought to Constantinople, and afterwards dispersed through the empire, where they are purchased by the wealthy. When the Turks subdued Egypt (the M. Volney), they should undoubtedly have prohibited this dangerous traffic; their omitting

(a) These fangiacs are the governors of provinces.

(b) Each of these coins is in value about half a crown English; and the tribute since that time has been augmented to 800,000 asliy, or about L.100,000 Sterling.

(c) Each caiz weighs 25 ocs, and each ocs is equal to two pounds ten ounces English avoirdupois weight.
For a considerable time the Porte had neglected the affairs of this province; and in order to restrain the Pachas, had suffered the divan to extend its power till the chiefs of the janizaries and azabs were left without control. The soldiers themselves, become citizens by the marriages they had contracted, were no longer the creatures of Constantinople; and a change introduced into their discipline still more increased these disorders. At first the seven military corps had one common treasury; and though the society was rich, individuals, not having any thing at their own disposal, could effect nothing. The chiefs, finding their power diminished by this regulation, had interest enough to get it abolished, and obtained permission to pollute distinct property, lands and villages. And as these lands and villages depended on the Mamlouk governors, it was necessary to conciliate them to prevent their oppositions. From that moment the boys acquired an ascendancy over the folders, who till then had treated them with disdain; and this could not but continually increase, since their governments procured them considerable riches. These they employed in creating themselves friends and creatures. They multiplied their slaves; and after emanipating them, employed all their interest to promote them to various employments, and advance them in the army. These upstarts, retaining for their patrons the same superstitious veneration common in the East, formed factions implicitly devoted to their pleasure. Thus, about the year 1745, Ibrahim, one of the khiays (b) of the janizaries, rendered himself in reality master of Egypt; having managed matters so well, that of the 24 beys or fanjacies eight were of his household. His influence too was augmented by always leaving vacancies in order to enjoy the emoluments himself; while the officers and folders of his corps were attached to his interest; and his power was completed by gaining over Rodoan, the most powerful of all the colonels, to his interest. Thus the Pacha became altogether unable to oppose him, and the orders of the Sultan were less respected than those of Ibrahim. On his death in 1757, his family, i.e. his enfranchised slaves, continued to rule in a despotic manner. Waging war, however, among each other, Rodoan and several other chiefs were killed; until, in 1766, Ali Bey, who had been a principal actor in the disturbances overcame his enemies, and for some time rendered himself absolute master of Egypt.

Of this manner there are various accounts. The following is that given M. Volney. He begins with observing, that the private hierophy of the Mamlouks in general must be subject to great uncertainty, by reason of their being generally carried off from their parents at a time of life when they can remember but little or nothing of their parents; and he remarks, that they are likewise unwilling to communicate the little they may happen to remember. It is most commonly supposed, however, that Ali Bey was born among the Abazans, a people of Mount Caracizes; from whom, next to the Circassians, the slaves most valued by the Turks, and other nations who deal in that commodity, are to be obtained. Having been brought to a public sale at Cairo, Ali Bey was bought by two Jew brothers named Isaac and Youfif, who made a present of him to Ibrahim Kiaya. At this time he is supposed to have been about 13 or 14 years old, and was employed by his patron in offices similar to those of the pages belonging to European princes. The usual education was also given him, viz. that of learning to manage a horfe well; fire a carbine and pif- tol; throw the djerid, a kind of dart used in the diversions of that country, and which shall be afterwards described. He was also taught the exercise of the falte, and a little reading and writing. In all the feats of activity just mentioned, he discovered such impertinency, that he obtained the surname of Dyjendall, or "madman;" and, as he grew up, discovered an ambition proportionable to the activity displayed in his youth. About the age 18 or 20, his patron gave him his freedom; the badge of which among the Turks is the letting the beard grow, for among that people it is thought proper only for women and slaves to want a beard. By his kind patron also he was promoted to the rank of kachef or governor of a district, and at last elected one of the 24 beys. By the death of Ibrahim in 1757, he had an opportunity of satisfying his ambition; and now engaged in every scheme for the promotion or disgrace of the chiefs, and had a principal share in the ruin of Rodoan Kayaya above-mentioned. Rodoan's place was quickly filled by another, who did not long enjoy it; and in 1762 Ali Bey, then styled Sbait-el-Bauld, having got Abdelrahman, the policelf at that time, exiled, procured himself to be elected in his room. However, he soon shared his fate of the reft, being condemned to retire to Gaza. This place, being under the dominion of a Turkish pacha, was by no means agreeable; for the reason Ali having turned off to another place, kept himself concealed for some time, until in 1766 his friends at Cairo procured his recall. On this he appeared suddenly in that city; and in one night killed four of the boys who were inimical to his designs, banished the whole power to himself. Still, however, his ambition was not satisfied; and he determined on nothing less than to throw off his independence on the Porte altogether, and become sultan of Egypt. With this view he expelled the pacha, refused to pay the accursed tribute, and in the year 1768 proceeded to coin money in his own name. The Porte being at that time on the eve of a dangerous war with Russia, had not leisure to attend to the proceedings of Ali Bey; so that the latter had an opportunity of going forward with his enterprises very vigorously. His first expedition was against an Arab overcomer prince named Hammun; against whom he sent an Arabian his favourite Mohamed Bey, under pretence that prince the former had concealed a treasure entrusted with him by Ibrahim Kiaya, and that he afforded protection to rebels. Having destroyed this unfortunate prince, he next began to put in execution a plan proposed to him by

(b) These were the commanding officers of the janizaries, azabs, &c. who after the first year laid down their employments, and became veterans, with a voice in the divan.
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His expedition into Syria.

E g y p t

The reader must not here figure to himself a number of complicated and artificial movements; such as those which, within the last century, have reduced war with us to a science of system and calculation. The Arians are unacquainted with the first elements of this conduct. Their armies are mere mobs, their marches ravages, carrying their campaigns inroads, and their battles bloody fray. The strongest or the most adventurous party goes in quest of the other, which frequently flies without making any resistance. If they land their ground, they engage pell-mell, discharge their carbines, break their spears, and hack each other with their sabres; for they have seldom any cannon, and when they have, they are but of little service. A panic frequently diffuses itself without cause; one party flies, the other follows victory; the vanquished submit to the will of the conqueror, and the campaign often terminates without a battle.

Such, in a great measure, were the military operations in Syria in the year 1771. The combined army of Ali Bey and Sheik Daher marched to Damascus. The Pachas waited for them; they approached, and, on the 6th of June, a decisive action took place; the Mamlouks and Safadians rushed on the Turks with such fury, that, terrified at their courage, they immediately took to flight, and the Pachas were not the least in endeavour to make their escape. The allies became masters of the country, and took possession of the city without opposition, there being neither walls nor fortresses to defend it. The castle alone refited. Its ruined fortifications had not a single canister, nor much less gunners; but it was surrounded by a muddy ditch, and behind the ruins were posted a few musketeers; and these alone were sufficient to check this army of cavalry. As the besieged, however, were already conquered by their fears, they capitulated the third day, and the place was to be surrendered next morning, when, at day break, a most extraordinary revolution took place.

This was no less than the defection of Mohammed Defeconom Beys himself, whom Ofman had gained over in a conference of Alliey's general. The report of his arrival in Egypt reached Cairo; and, in the month of April 1772, having defeated the troops of Ali in a rencontre, entered the city dexterously by a narrow entrance, and with difficulty got into Egypt by the assistance of Ali Bey, whom he immediately joined with the troops of Sheik Daher, whom he immediately joined with the

These are the chief events of the year 1771, and the events will be found in the following pages of this work in a manner more correct and accurate than the above, which are merely intended as a rapid sketch of the military operations in Syria. He has, however, given the following description of the events in a narrative form.
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E G Y

118

Defeats the Turks, and retrieves his affairs.

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He is ruined by his own impatience.

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Refused by Mohammed Bey.

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His expedition against Sheikh Daher.

troops he had with him. The Turks under Oldman were at that time besieging Sidon, but raised the siege on the approach of the Allied armies, concluding of about 600 cannon. Though the Turkish army was at least three times their number, the allies did not hesitate to attack them, and gained a complete victory. Their affairs now began to wear a more favourable aspect; but the military operations were retarded by the siege of Yafa, a place which had revolted; and which, though defended only by a garden wall, without any ditch, held out for eight months. In the beginning of 1773 it capitulated, and Ali Bey began to think of returning to Cairo. For this purpose Sheikh Daher had promised to furnish him with succours; and the Roulette, with whom he had now contracted an alliance, made him a promise of the like kind. Ali, however, ruined every thing by his own impatience. Deceived by an artificer, who pretended that the auspicious moment when he was highly favoured by the flara was just arrived; he would needs set out without waiting for the arrival of his allies. He was also farther deceived by a stratagem of Mohammed, who had by force extorted from the friends of Ali Bey letters pressuring his return to Cairo, where the people were weary of his ungrateful flave, and wanted only his presence in order to expel him. Confiding in these promises, Ali Bey imprudently set out with his Mamlouks and 1500 Safadans given him by Daher; but had no sooner entered the desert which separates Gaza from Egypt, than he was attacked by a body of 1000 chosen Mamlouks who were lying in wait for his arrival. They were commanded by a young Bey, named Mourad, who, being enamoured of the wife of Ali Bey, had obtained a promise of her from Mohammed, in case he could bring her husband’s head. As soon as Mourad perceived the duft by which the approach of Ali Bey’s army was announced, he rushed upon him, attacked and took prisoner Ali Bey himself, after wounding him in the forehead with a fable. Being conducted to Mohammed Bey, the latter pretended to treat him with extraordinary respect; and ordered a magnificent tent to be erected for him; but in three days he was found dead of his wounds, as was given out; though some affirm, perhaps with equal reason, that he was poisoned.

After the death of Ali Bey, Mohammed Bey took upon him the supreme dignity; but this change of masters proved of very little service to the Egyptians. At first he pretended to be only the defender of the rights of the Sultan, resisted the usual tribute to Constantinople, and took the customary oath of unlimited obedience; after which he solicited permission to make war upon Sheikh Daher, the ally of Ali Bey. The reason of this request was a mere personal pique; and as soon as it was granted, he made the most diligent preparations for war. Having procured an extraordinary train of artillery, he provided foreign gunners, and gave the command of them to an Englishman named Robinson. He brought from Snez a cannon 16 feet long, which had for a considerable time remained useless; and at length, in the month of February 1776, he appeared in Syria with an army equal in number to that which he had formerly commanded when in the service of Ali Bey. Daher’s forces, desiring to be able to cope with such a formidable armament, abandoned Gaza, which Mohammed immediately took possession of, and then marched towards a fortified town named Yafa. The history of this siege M. Volney gives as a specimen of the Asiatic manner of conducting operations of that kind. “Yafa (says he) is the ancient Joppa, situated on a part of the coast, in the general level of which is very little above the sea. The city is built on an eminence, in the form of a fu­gar loaf, in height about 130 feet perpendicular. The houses distributed on the declivity, appear rising above each other, like the steps of an amphitheatre. On the summit is a small citadel, which commands the town; the bottom of the hill is surrounded by a wall without a rampart, of 12 or 14 feet high, and two or three in thickness. The battlements of the top are the only tokens by which it is distinguished from a common garden wall. This wall, which has no ditch, is environed by gardens, where lemons, oranges, and citrons grow in this light soil to a most prodigious size. The city was defended by five or six hundred Safadans and as many inhabitants, who, at the sight of the enemy, armed themselves with their fabres and muskets; they had likewise a few brads cannon, 24 pounders, without carriages; these they mounted as they could, on timbers prepared in a hurry; and supplying the place of experience by hatred and courage, they replied to the funnions of the enemy with menaces and cannon-shot.

Mohammed, finding he must have recourse to force, formed his camp before the town; but was so little acquainted with the business in which he was engaged, that he advanced within half cannon-shot. The bullets, which showered upon the tents, apprizing him of his error, he retreated; and, by making a fresh experiment, was convinced he was still too near. At length he discovered the proper distance, and set up his tent, in which the most extravagant luxury was displayed; around it, without any order, were pitched those of the Mamlouks, while the Barbary Arabs formed huts with the trunks and branches of the orange and lemon-trees, and the followers of the army arranged themselves as they could: a few guns were distributed here and there; and, without making a single entrenchment, they called themselves encamped.

“Batteries were now to be erected; and a sot of rising ground was made choice of to the south-eastward of the town, where, behind some garden walls, eight pieces of cannon were pointed, at 200 paces from the town; and the firing began, notwithstanding the musketry of the enemy, who, from the tops of the terraces, killed several of the gunners.

“Tt is evident that a wall only three feet thick, and without a rampart, must soon have a large breach in it; and the question was not now how to mount, but how to get through it. The Mamlouks were for doing it on horseback; but they were made to comprehend that this was impossible; and they contented, for the first time, to march on foot. It must have been a curious sight to see them, with their huge breeches of thick Venetian cloth, embrowned with their tucked up buckles, their crooked sabres in hand, and pistols hanging to their sides, advancing and tumbling among the ruins of the wall. They imagined that they had conquered every difficulty when this obstacle was surmounted; but the besieged, who formed a better judgment, waited till they arrived at the empty space between...
The inhabitants of Egypt, between the city and wall; where they affailed them from the terraces and windows of the houses with such a shower of bullets, that the Mamlouks did not so much as think of firing their own, but were entirely overpowered and terrified, that the breach was utterly impracticable, since it was impossible to enter it on horseback. Morad Bey brought them several times back to the charge, but in vain.

"Six weeks passed in this manner; and Mohammed was distracted with rage, anxiety, and despair. The besieged, however, whose numbers were diminished by the repeated attacks, became weary of defending alone the cause of Daher. Some perrons began to treat with the enemy; and it was proposed to abandon the place, on the Egyptians giving hostages. Conditions were agreed upon, and the treaty might be accepted its provisions. Thus a new expedition became necessary. As the work was already mentioned from Damasc to Cairo, Sheik Da'ir, a village situated on the Nile, 40 leagues above Cairo. Here they took up their residence, and being masters of the river, found reduced Cairo to despair by intercepting its provisions. Thus a new expedition became necessary, and Ibrahim took the command of it upon himself. In the month of October 1783, he set out with an army of 2000 cavalry; the two armies came in sight of each other, but Ibrahim thought proper to terminate the affair by negotiation. This gave such offence to Morad, who suspected some plot against himself, that he left Cairo. A war between the two rivals was now daily expected, and the armies continued for 25 days in sight of each other, only separated by the river. Negotiations took place; and the five exiled beys, finding themselves abandoned by Morad, took to flight, but were pursued and brought back to Cairo. Peace seemed now to be re-established; but the jealousy of the two rivals producing new intrigues, Morad was once more obliged to quit Cairo in 1784. Forming his camp, however, directly at the gates of the city, he appeared so terrible to Ibrahim, that the latter thought proper in his turn to retire to the desert, where he remained till March 1785. A new treaty then took place; by which the rivals agreed to share the power between them, though there was certainly very little probability that such a treaty would be long observed. Since that time we have no accounts of any remarkable transaction in Egypt; nor indeed can we reasonably expect anything of consequence in a country where matters are managed, as M. Volney expresses himself, by a series of "cabals, intrigues, treachery, and murders."

Of late Egypt has been visited by several travellers, all of whom have published descriptions of the country, its productions, inhabitants, &c. The latest are M. Savary, M. Volney, the baron de Tott, and Mr. Bruce; and from the accounts published by those gentlemen the following geographical description is principally compiled.

The Nile river is still divided into two principal parts, called the Upper and Lower Egypt. According to M. the country.

1

Account of

Egypt.
In the middle that long plain which, even where widest, is not more than nine leagues over. Here the Nile is confined in its course between these impervious barriers, and during the time of its inundation overflows the country all the way to the foot of the mountains; and Mr. Bruce observes that there is a gradual slope from the bed of the rivers to those mountains on both sides. The baron de Tott says, that the mountains four leagues from the Nile, and facing Cairo, "are only a ridge of rocks about 40 or 50 feet high, which divide Egypt from the plains of Libya; which ridge accompanies the course of the river, at a greater or less distance, and seems as if only intended to serve as a bank to the general inundation."

Lower Egypt, according to M. Savary, comprehends all the country between Cairo, the Mediterranean, the Isthmus of Suez, and Libya. "This immense plain (says he) presents on the borders of its parching sands a stipe of lands cultivated along the canals of the river, and in the middle a triangular island to which the Greeks gave the name of Delta;" at the top of the angle of which, the baron de Tott informs us, the rocks of Libya and the coasts of Arabia open and recede from each other towards the east and west, parallel to the Mediterranean. "This great extent of country, from the kingdom of Barca to Gaza, is either overflowed by the river, or capable of being so; which thus fertilizes in a high degree a tract of country seemingly devoted to perpetual barrenness on account of the want of rain and the heat of the climate."

According to the testimonies of both Mr. Bruce and M. Volney, the coast of Egypt is so extremely low, that it cannot be discovered at sea till the mariners come within a few leagues of it. In ancient times the sailors pretended to know when they approached this country by a kind of black mud brought up by their founding-line from the bottom of the sea; but this notion, though as old as the days of Herodotus, has been discovered to be a mistake by Mr. Bruce, who found the mud in question to arise while the vessel was opposite to the delta of Barca. All along the coast of Egypt a strong current sets to the eastward.

In former times Egypt was much celebrated for its fertility; and there is great reason to believe, that were the same pains bestowed upon the cultivation of the ground, and the distribution of the waters of the Nile in a proper manner, the same fertility would still be found to remain. The cause of decrease in the produce of Egypt we shall describe in the words of M. Savary. "The canals," says he, speaking of the Delta, "which used to convey fertility with their waters, are now filled. The earth no longer watered, and continually exposed to the burning ardour of the sun, is converted into a barren sand. In those places where formerly were seen rich fields and flourishing towns, on the Pelusiac, the Partiotic, and the Meneefian branches, which all strike out from the canal of Damietta, nothing is to be found at this day but a few miserable hamlets, surrounded by date-trees and by deferts. These once navigable canals are now no more than a vain reminiscence of what they were; they have no more communication with the lake Menzali, but what is merely temporary, on the swelling of the Nile; they are dry the remainder of the year."

Concerning this island, it has been the opinion of a great many, even from very ancient times, that it was produced by the mud brought down by the inundations of the Nile; and this opinion we find adopted in the strongest manner by M. Savary. His account of the supposed rise of the Delta, and indeed of the greatest part of Egypt, is to the following purpose. In those early ages where history has not fixed any epoch, a certain people descended from the mountains near the cataracts into the valley overflowed by the Nile, and which was then an uninhabitable morass overgrown with reeds and cane. In what manner, or from what motive, these people were induced to descend from their ancient habitations to such a place, or how they found means to penetrate into a morass, which he expressly tells us was impenetrable, we are not informed, neither is it to our present purpose to inquire. At that time, however, the sea bathed the feet of those mountains where the pyramids are built, and advanced far into Libya. It covered also part of the Isthmus of Suez, and every part of what we now call the Delta formed a great gulph. After many ages the Egyptians, by what means is unknown, at least not specified by our author (though they ought to have been so, as the country it seems was then overflowed not only by the river but by the ocean), formed canals to carry off the flagrant waters of the Nile; opposed strong dykes to its ravages; and, tired of dwelling in the caverns of rocks, built towns and cities upon spots elevated either by nature or art. Already the river was kept within its bounds, the habitations of men were out of the reach of its inundations, and experience had taught the people to foresee and announce them. One of the kings of Egypt undertook to change the course of the river. After running 15 leagues between the barriers already mentioned, meeting with an unformitable obstacle to the right, it turned suddenly to the left; and taking its course to the southward of Memphis, it spread its waters thro' the sands of Libya. The prince we speak of caused a new bed to be dug for it to the east of Memphis; and by means of a large dyke obliged it to return between the mountains, and discharge itself into the gulph that bathes the rock on which the castle of Cairo is built. The ancient bed of the river was still to be seen in the time of Herodotus, and may even be traced at this day across the deferts, passing to the westward of the lakes of Natrum. The Arabs still believe upon it the name of Bahir Belamir, "or sea without water," and it is now almost choked up. To the labours of this monarch Egypt is indebted for the Delta. A reflux of the sea was occasioned by the enormous weight of the waters of the Nile, which precipitated themselves into the bottom of the gulph. Thus the sands and mud carried along with them were collected into heaps; and thus the Delta, at first very inconsiderable, rose out of the sea, and grew to the size it now has. It was a gift of the river, and it has since been defended against the attacks of the ocean by raising dykes around it. Five hundred years before the Trojan war, according to Herodotus,
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The Delta was in its infancy; eight cubits of water being then sufficient to overflow it. Strabo tells us, that boats sailed over it from one extremity to the other; and that its towns, built upon artificial eminences, resembled the islands of the Egean Sea. At the time that Herodotus visited this country, fifteen cubits were necessary to cover all the Lower Egypt; but the Nile then overflowed the country for the space of two days journey to the right and left of the island. Under the Roman Empire sixteen cubits performed the same effect. When the Arabs came to have the dominion, sixteen cubits were requisite; and at this day eighteen are necessary to procure a plentiful crop, but the inundation stops at Cairo and the neighbouring country, without being extended over the Lower Egypt. Sometimes, however, the Nile rises to twenty-two cubits; and the cause of this phenomenon is the mud for so many years accumulated on the island. Here, in the space of 3284 years, we see the Delta elevated fourteen cubits. Our author wrote in 1777, and informs us that twice made the tour of Egypt, the Nile overflowed the lands, except in the lower parts, when it ceases to be overflowed; and that its towns, built upon artificial eminences, were gradually filled with water, which, by the waters, by which the land-marks were covered, in the Coptic vocabularies, has preserved the name of Nefit. This town, formerly a sea-port, is now nine leagues distant from the sea; all which space the Delta has increased in length from the time of Ptolemies in the present. Homer, in his Odyssey, puts the following words in the mouth of Menelaus: ‘In the stormy sea which washes Egypt, there is an island called Pharos. Its distance from the shore is such, that a vessel with a fair wind may make the passage in a day.’ From the way in which he speaks of this island in other places, alo, we may suppose that the island of Pharos, in his time, was not less than twenty leagues distant from the Egyptian coast, though now it forms the port of Alexandria; and this sentiment is confirmed by the most ancient writers. ‘What prodigious changes great rivers occasion on the surface of the globe! How they elevate at their mouths, islands which become at length large portions of the continent! It is thus that the Nile has formed almost all the Lower Egypt, and created out of the waters the Delta, which is 90 leagues in circumference. It is thus that the Meander, constantly repelling the waves of the Mediterranean, and gradually filling up the gulf into which it falls, has placed in the middle of the land the town of Miletus, formerly a celebrated harbour. It is thus that the Tigris and the Euphrates, let loose from the Armenian hills, and sweeping with them in their course the lands of Mesopotamia, are imperceptibly filling up the Persian gulf.’

These are the reasons assigned by Mr. Savary for Mr. Bruce's thinking that the Delta, as well as the greatest part of the Lower Egypt, have been produced by the Nile; but this opinion is violently contended by other late travellers, particularly Mr. Bruce, who has given a pretty long dissertation upon it, as well as many occasional remarks through the course of his work. He begins with observing, 1. That the country of Egypt is entirely a valley bounded by rugged mountains; whence it might seem natural to imagine that the Nile, overflowing a country of this kind, would be more ready to wash away the soil than to add to it. 2. It is observed by Dr. Shaw, and the same is confirmed by our author, that there is a gentle slope from the middle of the valley to the foot of the mountains on each side; so that the middle, in which is the Delta of Egypt, is really higher than any other part of the valley. Large trenches are cut across the country from the channel of the river, and at right angles with it, to the foot of the mountains. 3. As the river swells, the canals become filled with water, which naturally descending to the foot of the mountains, runs out at the farther end, and overflows the adjacent level country. 4. When the water, having attained the lowest ground, begins to evaporate, it does not acquire any motion by reason of the canal's being at right angles with the channel of the Nile, unless in case of excessive rains in Ethiopia, when the water by its regurgitation again joins the stream. In this case, the motion of the current is communicated to the whole mass of waters, and every thing is swept away by them into the sea. It has been the opinion of several authors, that there was a necessity for measuring the height of the inundation on account of the quantity of mud brought down annually by the waters, by which the land-marks were covered, so that the proprietors could not know their own grounds after the river inundated. But whatever might be the reason of this covering of the land-marks in ancient times it is certain that the mud left by the Nile could not be in the time of Herodotus, or during any period of time assigned by that historian; for he assigns only one foot of increase of soil throughout Egypt in an hundred years from the mud left by the river: the increase during one year, therefore, being only the hundredth part of a foot, could not cover any land-mark whatever. Besides, the Egyptian lands are at this day parted by huge blocks of granite, which frequently have gigantic heads at the ends of them; and these could not, at the rate mentioned by Herodotus, be covered in several thousand years. 6. The Nile does not now bring down any great quantity of mud; and it is absurd to suppose that it can at present bring down as much as it did soon after the creation, or the ages immediately succeeding the deluge. Throughout Abydus, according to the testimony of our author, the channel of every torrent is now worn to the bare rock, and almost every rivulet runs in a hard stony bed, all the loose earth being long ago washed away; so that an annual and
of the Nile during the time of the inundation in different places. At Balboch, when just coming down from the cultivated parts of Abyssinia, and before it enters Sennar, the sediment is composed of fat earth and sand, and its quantity is exceedingly small. At the junction of the Nile and Atbaras the quantity of sediment is very little augmented; consisting still of the same materials, but now mostly sand. At Syene the quantity of sediment was almost nine times greater than before; but was now composed almost entirely of sand, with a very small quantity of black earth. The conclusion of our author's experiments, however, is different from what we should have been led to expect from those just mentioned. "The experiment at Rosetta (says he) was not so often repeated as the others: but the result was, that in the strength of the inundation, the sediment consisted mostly of sand; and, towards the end, was much the greater part earth. I think these experiments conclusive, as neither the Nile coming fresh from Abyssinia, nor the Atbara, though joined by the Mareb, likewise from the same country, brought any great quantity of silt from thence." 8. Our author goes on to observe, that had the Nile brought down the quantities of mud which it has been said it does, it ought to have been moist covered with it at Syene; as there it contained the whole that was to be conveyed by it into Egypt. Instead of this, however the principal part of the sediment at this place was sand; and this very naturally accounted for from the vast quantities of sand taken up by the winds in the deserts between Gooz and Syene. Here our traveller frequently saw vast pillars of this kind of sand, which is so fine and light as to form an impalpable powder, traversing the desert in various directions. Many of these were driven upon the river; and when it became calm in the evening, fell down into it entirely; thus, affording materials for the many sandy islets to be met with in the Nile.

9. Mr Bruce adopts the opinion of those who suppose that there has been a continual decrease of water since the creation of the world. In this case, therefore, if the land of Egypt had been continually increasing in height while the water that was to cover it decreased; there must have been frequent famines on account of the want of a sufficient inundation. But so far is this from being the case, that, according to the testimony of several Arabian MSS. there had not, when Mr Bruce was in Egypt, been one scarce season from the lowest of the inundation for 34 years; tho' during the same space they had three times experienced a famine by too great an abundance of water, which carried away the millet. 10. If there had been such an increase of land as Herodotus and others suppose, it must now have been very perceptible in some of the most ancient public monuments. This, however, is by no means the case. The base of every obelisk in Upper Egypt is to this day quite bare and visible. Near Thebes there are still extents of two Colosal figures plainly delineated for nilometers, and which ought by this time to have been almost covered with earth; but notwithstanding the length of time these have remained there, they are still bare to the very base.

The strongest argument which the advocates for the increase of land of Egypt can make use of is, that the measures by which the quantity of inundation is determined are smaller now than in former times; and these small measures are said to have been introduced by the Saracens. On this Mr Bruce very justly observes, that such an expedient could not have answered any good purpose; as no decrease of the measure could have augmented the quantity of corn produced by the ground. M. Savary observes, that, to render his calculation concerning the growth of land in Egypt absolutely exact, it would be necessary to determine the precise length of the Greek, Roman, and Arabian cubit; and even to know the different altercations which that measure had undergone among these people: But this nicety he thinks needless; looking upon the general fact to be fully established by what he had before said. Mr Bruce, however, has treated the subject with much greater accuracy. He observes, that from the situation of Canopus, the distance between Egypt and Cyprus, and the extension of the land to the northward, it appears that no addition of any consequence has been made to it for 3000 years past. The only argument left for the increase of land therefore must be taken from the nilometer. The use of this instrument was to determine the quantity of inundation, to determine whether the crop would be sufficient to enable the people to pay the taxes exacted of them by the sovereign or not. The first step was to know what space of ground was overflowed in a given number of years; and this being determined by mensuration, the next thing was to ascertain the produce of the ground upon an average. Thus becoming acquainted with the greatest and least crops produced, together with the exact extent of ground overflowed, they were furnished with all the necessary principles for constructing a nilometer; and nothing now remained but to erect a pillar in a proper place, and divide it exactly into cubits. This was accordingly done; the pillar was first divided into cubits, and these again subdivided into digits. The first division of this kind was undoubtedly that mentioned in scripture, and called the cubit of a man; being the length of the arm from the middle of the round bone in the elbow to the point of the middle finger; a measure still in use among all rude nations. As no standard could be found by which this measure might be exactly determined, authors have differed very much concerning the true length of the cubit when reduced to our feet and inches. Dr Arbuthnot reckons two cubits mentioned in scriptures; one of them containing one foot nine inches and *** inches of an inch; the other one foot and *** inches of a foot; but Mr Bruce is of opinion that both of these are too large. He found, by mensuration, the Egyptian cubit to be exactly one foot five inches and three-fifths of an inch; and Herodotus mentions that in his time the cubit used for determining the increase of the Nile was the Samian cubit, about 18 of our inches. The latter also informs us, that in the time of Moeris, the minimum of increase was 8 cubits, at which time all Egypt below the city of Memphis was overflowed; but that his time 16 or at least 15 cubits were necessary to produce the same effect. But to this account Mr Bruce objects, that Herodotus could have no certain information concerning the nilometer, because he himself says that the
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priests, who alone had access to it, would tell him nothing of the matter. Herodotus also informs us, that in the time of Moeris, great lakes were dug to carry off the waters of the inundation; and this superfluous quantity Mr. Bruce supposes to have been conveyed into the desert for the use of the Arabs, and that by such a vast drain the rise of the water on the nilometer would undoubtedly be diminished. But even granting that there was such a difference between the rise of the water in the time of Moeris and in that of Herodotus, it does not appear that any thing like it has appeared ever since. Strabo, who travelled into Egypt 400 years after the time of Herodotus, found that eight cubits were then the minimum, as well as in the time of Moeris. From some passages in Strabo, however, it appears that it required a particular exertion of industry to cause this quantity of water produce a plentiful crop; but there is not the least reason to suppose, that the very same industry was not necessary in the time of Moeris; so that still there is not any increase of land indicated by the nilometer. About 100 years afterwards, when the emperor Julian was king of Egypt, we are informed from unquestionable authority, that 16 cubits were the minimum when the people were able to pay their tribute; and in the fourth century, under the emperor Julian, 15 cubits were the standard; both which accounts correspond with that of Herodotus. Lastly, Procopius, who lived in the time of Julianus, informs us, that 18 cubits were then requisite for a minimum.

From these accounts, so various and discordant, it is obvious that no certain conclusion can be drawn. It is not indeed easy to determine the reason of this difference in point of fact. The only conjecture we can offer is, that as it appears that by a proper care a smaller quantity of water will answer the purpose of producing a plentiful crop, so it is not unreasonable to suppose that at different periods the industry of the people has varied so much as to occasion the disagreement in question. This would undoubtedly depend very much upon their governor; and indeed Strabo informs us that it was by the care of the governor Petronius, that such a small quantity of water was made to answer the purpose. The conclusion drawn by Mr. Bruce from the whole of the accounts above related, is, that from them it is most probable that no increase of land has been indicated by the nilometer from the time of Moeris to that of Julianus.

On the conquest of Egypt by the Saracens, their barbarous and rapid khalf destroyed the nilometer, causing another to be built in its stead, and afterwards fixed the standard of paying tribute considerably below what it had usually been. The Egyptians were thus kept in continual terror, and constantly watched the new nilometer to observe the gradual increase or decrease of the water. On this he ordered the new nilometer to be destroyed, and another to be constructed, and all access to it to be denied to the people. Which prohibition is still continued to Christians; though our author found means to get over this obstacle, and has given a figure of the instrument itself. That the people might not, however, be supposed to remain in total ignorance of their situation, he commanded a proclamation to be daily made concerning the height of the water, but in such an unintelligible manner that nobody was made any wiser; nor, according to our author, is the proclamation understood at this day. From his own observations, however, Mr. Bruce concludes, that 15 cubits are now the minimum of inundation, and as this coincides with the accounts of it in the times of Herodotus and Adrian, he supposes with great probability, that the same quantity of water has been necessary to overflow this country from the earliest accounts to the present time.

It now remains only to take notice of what is said by M. Savary concerning the former distance of the island of Pharos from the land to which it is now joined. With regard to his other assertions concerning the city of Meteis having been once a sea-port, M. Volney proves that he has quoted Strabo unfairly, and consequently no staves is to be laid upon them. The principal, indeed, the only evidence therefore which remains, is the passage already quoted from Homer, viz. that "the island of Pharos is as far distant from one of the mouths of the Nile as a vessel can sail in one day before the wind." "But (says M. Volney) when Homer speaks of the distance of this island, he does not mean the distance from the shore opposite, but that which another (M. Savary) has translated him, but from the land of Egypt and the river Nile. In the second place, by a day's sail we must not understand that indefinite space which the vessels, or rather the boats, of the ancient Greeks, could pass through in a day; but an accurate and determined measure of 540 stadia. This measure is ascertained by Herodotus, and is the precise distance between Pharos and the Nile, allowing, with M. d'Anville, 27,000 toises to 540 stadia. It is therefore far from being proved, that the increase of the Delta or of the continent was so rapid as has been represented; and, if we were disposed to maintain it, we should still have to explain how this shore, which has not gained half a league from the days of Alexander, should have gained eleven in the far shorter period from the time of Menelaus to that conqueror. The utmost extent of the encroachment of this land upon the sea, however, may be learned from the words of Herodotus; who informs us, that, "the breadth of Egypt, along the seacoast, from the gulf of Plinthe in the lake Serbonis near mount Caenus, is 3600 stadia; and its length from the sea to Helopolis 1350 stadia." Allowing therefore the stadium of Herodotus to be between 50 and 51 French toises, the 1500 stadia just mentioned are equal to 76,000 toises; which, at the rate of 57,000 to a degree, gives one degree and nearly 20 minutes and an half. But from the astronomical observations of M. Niebuhr, who travelled for the king of Denmark in 1761, the difference of latitude between Helopolis, now called Matara, and the sea, being one degree 20 minutes at Damietta, and one degree 24 minutes at Rosetta, there is a difference on one side of three minutes and an half, or a league and an half encroachment; and eight minutes and an half, or three leagues and an half on the other." Thus the dispute concerning the augmentation of the land of Egypt by the Nile seems to be absolutely decided; and the encroachments of it on the sea are trifling, that we may justly doubt whether they exist, or whether we are not entirely to attribute the apparent differences to those which certainly take place between the ancient and modern measurement. M. Volney gives a very particular description of the face of the country; but takes notice of the inconveniences under which travellers labour in this country, by which it is rendered extremely difficult to
no say any thing certain with regard to the nature of the soil or mineral productions. Thee arise from the barbarity and improvidency of the people, who imagine all the Europeans to be magicians and forcers, who come by their magic art to discover the treasures which the genii have concealed under the ruins. So deep rooted is this opinion, that no person dares walk alone in the fields, nor can he find any one willing to accompany him; by which means he is confined to the banks of the river, and it is only by comparing the accounts of various travellers that any satisfactory knowledge can be acquired.

According to this author, the entrance into Egypt at Rosetta presents a most delightful prospect, by the perpetual verdure of the palm-trees on each side, the orchards watered by the river, with orange, lemon, and other fruit-trees, which grow there in vail abundance; and the same beautiful appearance is continued all the way to Cairo. As we proceed farther up the river, he says, that nothing can more resemb le the appearance of the country than the marshes of the lower Loire, or the plains of Flanders; instead, however, of the numerous trees and country hoes of the latter, we most imagine some thin woods of palms and ficac- nores, with a few villages of mud-walled cottages, built on artificial mounds. All this part of Egypt is very low and flat, the declivity of the river being so gentle, that its waters do not flow at a greater rate than one league in an hour. Throughout the country nothing is to be seen but palm-trees, single or in clumps, which become more rare in proportion as you advance; with wretched villages composed of huts with mud-walls, and a boundless plain, which at different seasons is an ocean of fresh water, a miry morass, a verdant field, or a dusty desert; and on every side an extensive and foggy horizon, where the eye is wearied and disfigured. At length, towards the junction of the two branches of the river, the mountains of Cairo are discovered on the east; and to the south-west three detached mafles appear, which from their triangular form are known to be the pyramids. We now enter a valley which turns to the southward, between two chains of parallel eminences. That to the east, which extends to the Red Sea, merits the name of a mountain from its steepness and height, as well as that of a desert from its naked and savage appearance. Its name in the Arabic language is Nebatam, or the brown mountains. The western is nothing but a ridge of rock covered with sand, which has been very properly termed a natural mound or caufeway. In short, that the reader may at once form an idea of this country, let him imagine on one side a narrow sea and rocks; on the other, immense plains of sand; and in the middle, a river flowing through a valley of 150 leagues in length and from three to seven wide, which at the distance of 50 leagues from the sea separates into two arms; the branches of which wander over a foil almost free from obstacles, and void of declivity.

From comparing his own observations with those of other travellers, our author concludes, that the basis of all Egypt from Aphon (the ancient Syene) to the Mediterranean, is a continued bed of calcareous stone of whithieu, and somewhat soft, containing the same kind of shells met with in the adjacent seas, and which forms the immense quarries extending from Souniadi to Manfalout for the space of more than 25 leagues, according to the testimony of Father Sirard.

Mr. Bruce, however, gives us a much more particular account of the sources from whence were derived the vast quantities of marble met with in the remains of the deferts, ancient buildings in this country. These he discovered during his journey from Kennedy to Colleir on the Red Sea, before he took his expedition to Abyssinia. He gives a most dismal ideas of the deferts through which he passed. What hovses he met with were constructed, like those of Mr. Volney mentions, of clay, being no more than fix feet in diameter, and about ten in height. The mountains were the most dreary and barren that can be imagined; and the heat of the sun so great, that two ficks rubbed together only for half a minute would take fire and flame. In these burning regions no living creature was to be met with, even the po,lo-nois serpents and scorpions not being able to find subsistence. The first animal he saw was a species of ants in a plain called Hamra from the purple colour of its land; and it was remarkable that these insects were of the same colour with the land itself. No water was any where to be met with on the surface; though at a place called Lagaca there were some draw-wells, the water of which was more bitter than foot itself. At Hamra the porphyry mountains and quarries begin, the stone of which is at first soft and brittle; but the quantity is immense, as a whole day was taken up in passing by them. These porphyry mountains begin in the latitude of nearly 24 degrees, and continue along the coast of the Red Sea to about 22° 30', when they are succeeded by the marble mountains; these again by others of alabaster, and these last by basaltic mountains. From the marble mountains our author selected twelve kinds, of different colours, which he brought along with him. Some of the mountains appeared to be composed entirely of red and others of green marble, and by their different colours afforded an extraordinary spectacle. Not far from the porphyry mountains the cold was so great, that his camels died on his return from Abyssinia, though the thermometer told no lower than 42°.

Near to Colleir he discovered the quarries whence the ancients obtained those immense quantities of marble with which they constructed so many wonderful works. The first place where the marks of their operations were very perceptible, was a mountain much higher than any they had yet passed, and where the stone was so hard that it did not even yield to the blows of a hammer. In this quarry he observed that some darts or channels for conveying water terminated; which, according to him, shows that water was one of the means by which these hard stones were cut. In four days, during which our author travelled among these mountains, he says, that he had "passed more granite, porphyry, marble, and Jasper, than would build Rome, Athens, Corinth, Syracuse, Memphis, Alexandria, and half a dozen such cities." It appeared to him that the passages between the mountains and which he calls defiles, were not natural but artificial openings; where even whole mountains had been cut out, in order to preserve a gentle slope towards the Red Sea. This defert our author passed not under one foot in 50; so that the carriages must have gone very easily, and rather required something to re-
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Concerning the mountains in general, he observes, that the porphyry is very beautiful to the eye, and is discovered by a fine purple sand without any gloss. An unvariegated marble of a green colour is generally met with in the same mountain; and where the two meet, the marble becomes soft for a few inches, but the porphyry retains its hardness. The granite has a dirty brown appearance, being covered with sand; but on removing this, it appears of a grey colour with black spots, with a reddish cast all over it. The granite mountains lie nearer to the Red Sea, and seem to have afforded the materials for Pompey's pillar. The redness abovementioned seems to go off on exposure to the air: but re-appears on working or polishing the stone further. The red marble is next to the granite, though not met with in the same mountain. There is also a red kind with white veins, and vast quantities of the common green fenritine. Some samples of that beautiful marble named jasper were likewise observed; one of them of that yellowish cast called quaker-colour, the other of the bluish kind named dove-colour. The most valuable kind is that named verde antico, which is found next to the Nile in the mountains of fenritine. It is covered by a kind of blue flaky stone, somewhat lighter than a flate, more beautiful than most kinds of marble, and when polished having the appearance of a volcanic lava. In these quarries the verde antico had been uncovered in patches of about 20 feet square. There were small pieces of African marble scattered about in several places, but no rocks or mountains of it; so that our author conjectures it to lie in the heart of some other kind. The whole is situated on a ridge with a descent to the east and west, by which means it might easily be conveyed either to the Nile or Red Sea, while the hard gravel and sandy ground would readily allow the heaviest carriages to be moved with very little force.

Travellers have talked of an emerald mine in these defects; but from the researches of Mr Bruce, it does not appear to have any existence. In the Red Sea indeed, in the latitude of 25° 3', at a small distance from the fourth-western coast, there is an island called the Mountain of Emeralds; but none of these precious stones are to be met with there. Here, as well as on the continent, there were found many pieces of a green pellicid substance; but veined, and much softer than rock-crystal, though somewhat harder than glass. A few yards up the mountain he found three pits, which were suppos'd to have been the mines whence the ancients obtained the emeralds; but though many pieces of the green substance abovementioned were met with about these pits, no signs of the true emerald could be perceived. This substance, however, he conjectures to have been the jenagrus of the Romans. In the mountains of Coiffeir, as well as in some places of the deferts of Nubia, our author found some rocks exactly resembling petrified wood. The only metal laid by the ancients to be produced in Egypt is copper. On the road to Suez, are found great numbers of those stones called Egyptian flints and pebbles, though the bottom is a hard, calcareous, and foporous stone. Here also M. Volney tells us, that the stones abovementioned, and which resemble petrified wood, are to be met with. These, he says, are in the form of small logs cut flanting at the ends, and might easily be taken for petrifactions, though he is convinced they are the real minerals.

F. Sicard mentions two lakes, from the water of Salt lakes, which is produced annually a great quantity of salt containing much mineral alkali; and M. Volney informs us, that the whole foil of this country is impregnated with salt; so that, upon digging to some depth in the ground, we always meet with brackish water impregnated in some degree with the mineral alkali as well as with common salt. The two lakes mentioned by Sicard are situated in the desert to the west of the Delta; and are three or four leagues in length, and about a quarter of a league in breadth, with a solid and rocky bottom. For nine months in the year they are without water; but in the winter time there oozes out of the earth a reddish violet-colored water, which fills the lakes to the height of five or six feet. This being evaporated by the return of the heat, there remains a bed of salt two feet thick and very hard which is broken in pieces with iron bars; and no less than 30,000 quintals are procured every year from these lakes. So great is the propenstiy of the Egyptian soil to produce salt, that even when the gardens are overflowed for the sake of watering them, the surface of the ground, after the evaporation and absorption of the water, appears glazed over with salt. The water found in the wells contains mineral alkali, marine salt, and a little nitre. M. Volney is of opinion, that the sterile mould of Egypt, which is of a black colour, differs essentially from that of the other parts of Egypt not originally derived from the internal parts of Ethiopia along with the water of the Nile. This seems to contradict what he had before advanced against M. Savary concerning the increase of the land of Egypt by means of the waters of this river: but there is no reason at all to suppose this kind of earth to be of a foreign origin, it being always the result of vegetation and cultivation. Even the most barren and sandy spots in the world, if properly watered, and such vegetables planted in them as would grow there, in time would be covered with this black earth as well as others; and of this kind of artificial formation of soil travellers give us a remarkable instance in the garden of the monks at Mount Sinai, where the country is naturally as barren as in any place in the world. "The monks of Sinai (says Dr. Shaw), in a long process of time, have covered over with dung and the (weepings of their convent near four acres of naked rocks; which produce as good cabbage, roots, fallad, and all kinds of pot-herbs, as any soil and climate whatsoever. They have likewise raised olive, plum, almond, apple, and pear trees, not only in great numbers, but of excellent kinds. The pears particularly are of such effeem at Cairo, that there is a present of them sent every year to the bahaw and perfons of the first quality. Neither are their grapes inferior in size and flavour to any whatsoever; it being fully demonstrated, by what a little garden produces, how far an indefatigable industry can prevail over nature; and that several places are capable of culture and improvement which were intend-ed by nature to be barren, and which the lazy and thriftful have always suffered to be so."

From this general account of the country, we may reasonably conclude, that the natural fertility of Egypt...
Egypt is not diminished in modern times, provided the same pains were taken in the cultivation of it as formerly; but this is not to be expected from the present degenerate race of inhabitants. "The Delta (says Mr Savary) is at present in the most favourable state for agriculture. Walked on the caft and west by two rivers formed by the division of the Nile, each of which is as large and more deep than the Loire, intersected by innumerable rivulets; it presents to the eye an immense garden, all the different compartments of which may be easily watered. During the three months that the Thebais is under water, the Delta pollutes fields covered with rice, barley, vegetables, and winter fruits. It is also the only part of Egypt where the same field produces two crops of grain within the year, the one of rice, the other of barley."

The only cause of all this fertility is the Nile, without which the whole country would soon become an uninhabitable desert, as rain falls very seldom in this part of the world. It flows with a very gentle stream through the flat country, and its waters are very muddy; so that they must have time to settle, or even require filtration before they can be drunk. For purifying the water, the Egyptians, according to M. Volney, use bitter almonds, with which they rub the vessel containing it, and then the water becomes light and good; but on what principle this ingredient acts, we cannot pretend to determine. Unglazed earthen vessels filled with water are kept in every apartment; which by a continual evaporation through their porous sub stance, render the contained fluid very cool even in the greatest heats. The river continues muddy for six mouths; and during the three which immediately precede the inundation, the stream being reduced to an incon siderable depth, becomes heated, green, fetid, and full of worms. The Egyptians in former times paid divine honours to the Nile, and fill hol it in great veneration. They believe its waters to be very nourishing, and that they are superior to any in the world; an opinion very excusable in them, as they have no other, and large draughts of cold water are among their highest luxuries.

This river, swelled by the rains which fall in Aby lini a, begins to rise in Egypt about the month of May; but the increase is incon siderable till towards the end of June, when it is proclaimed by a public crier thro' the streets of Cairo. About this time it has usually risen five or six cubits; and when it has risen to 16, great rejoicings are made, and the people cry out 

\[\text{Waffab Allah,} \text{ that is, that God has given them abundance.}\]

This commonly takes place about the latter end of July, or at farthest before the 20th of August; and the sooner it takes place, so much the greater are the hopes of a good crop. Sometimes, though rarely, the necessary increase does not take place till later. In the year 1705, it did not swell to 16 cubits till the 19th of September; the consequence of which was, that the country was depopulated by famine and pestilence.

We may easily imagine that the Nile cannot overflow the whole country of itself in such a manner as to render it fertile; for which reason there are innumerable canals cut from it across the country, as has already been observed, by which the water is conveyed to distant places, and almost every town or village has one of these canals. In those parts of the country where the inundation does not reach, and where more water is required than it can furnish, as for watering the gardens, they must have recourse to artificial means for raising it from the river. In former times they made use of Archimedes's screw*; but that is now dilated, and in place of it they have chosen the Persian wheel. This is a large wheel turned by oxen, having a rope hung with several buckets which fill as it goes round, and empty themselves into a cistern at the top. Where the banks of the river are high, they frequently make a basin in the side of them, near which they fix an upright pole, and another with an axle across the top of that, at one end of which they hang a great stone, and at the other a leathern bucket; this bucket being drawn down into the river by two men, is raised by the descent of the stone, and emptied into a cistern placed at a proper height. This kind of machine is used chiefly in the upper parts of the country, where the raising of water is more difficult than in places near the sea. When any of their gardens or plantations want water, it is conveyed from the cisterns into little trenches, and from thence conducted all round the beds in various rills, which the gardener easily lobs by raising the mould against them with his foot, and directs the current another way as he sees occasion.

The rise of the inundation is measured, as has already been observed, by an instrument adapted for the purpose, and called nilometer, or scale, which we translate nilometer. Mr Bruce informs us, that this is placed between Gacza and Cairo, on the point of an island named Rhoda, about the middle of the river, but somewhat nearer to Gacza. It is a round tower with an apartment, in the middle of which is a cistern nearly lined with marble. The bottom of this cistern reaches to that of the river, and there is a large opening by which the water has free access to the infinite. The rise of the water is indicated by an octagonal column of blue and white marble, on which are marked 30 pecks or cubits of 12 inches each. The two lowestmost of these have no subdivisions; but each of the rest is divided into 24 parts called digita; the whole height of the pillar being 36 feet 8 inches.

When the river has attained its proper height, all of the canals are opened, and the whole country lai under water. During the time of the inundation a certain vertical motion of the waters takes place; but notwithstanding this, the Nile is so easily managed, that many fields lower than the surface of its waters are preferred from injury merely by a dam of m filtering earth not more than eight or ten inches in thickness. This method is made use of particularly in the Delta when it is threatened with a flood.

As the Nile does not always rise to an height sufficient for the purposes of agriculture, the former sovereigns of Egypt were at vall pains to cut proper canals in order to supply the deficiency. Some of these are still preferred; but great numbers are rendered useless through the indolence or barbarity of their successors. Those which convey the water to Cairo, into the province of Fayoom; and to Alexandria, are still taken care of by government. The latter is watched by an officer appointed for that purpose, whose office it is to hinder the Arabs of Bachiya, who receive it for a

* See Hymenaeus.

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provided for, or opening it before the proper time, which would hinder the increase of the river. In like manner, that which conveys the water to Fayoum is watched and cannot be opened before that of Cairo, which is called the Canal of Trajan. A number of other canals, only taken care of by those who derive advantage from them, proceed from that arm of the Nile which runs to Damietta, and fertilize the province of Sharkia; which making part of the isthmus of Suez, is the most considerable of Egypt, and the most capable of a great increase of cultivation. The plains of Gaza which lie beyond, and are possessed by the Arabs, would be no less fertile, were it not for the excessive inclination these people have to destroy, so that they make war even with the spontaneous productions of the earth. A number of other canals run through the Delta; and the vestiges of those which watered the provinces to the eastward and westward, show that in former times these were the best cultivated parts of Egypt. "We may also presume (says the Baron de Tott), from the extent of the ruins of Alexandria, the construction of the canal, and the natural level of the lands which encompass the lake Marconis, and extend themselves eastward to the kingdom of Barca, that this country at present given up to the Arabs, and almost desert, was once sufficiently rich in productions of every kind to furnish the city of Alexandria with its whole subsistence."

The air and climate of Egypt are extremely hot, not only from the height of the fun, which in summer approaches to the zenith, but from the want of rain and from the vicinity of those burning and sandy deserts which lie to the southward. In the months of July and August, according to M. Volney, Reamur's thermometer stands, even in the most temperate apartments, at the height of 24 or 25 degrees above the freezing point; and in the southern parts it is said to rise still higher. Hence, he says, only two seasons should be distinguished in Egypt, the cool and the hot, or spring and summer. The latter continues for the greater part of the year, viz. from March to November or even longer; for by the end of February the sun is intolerable to an European at nine o'clock in the morning. During the whole of this season, the air seems to be inflamed, the sky sparkles, and every one sweats profusely, even without the least exercise, and when covered with the lightest dress. This heat is tempered by the inundation of the Nile, the fall of the night-dews, and the frequent evaporation; so that some of the European merchants, as well as the natives, complain of the cold in winter. The dew we speak of does not fall regularly throughout the summer as with us; the parched state of the country not affording a sufficient quantity of vapour for the purpose. It is first observed about St John's day (June 24th), when the river has begun to swell, and consequently a great quantity of water is raised from it by the heat of the sun, which being soon condensed by the cold of the night air, falls down in copious dew. It might naturally be imagined, that as for three months in the year Egypt is in a wet and marshy situation, the excessive evaporation and perspiration of the flagrant waters would render it very unhealthy. But this is by no means the case. The great dryness of the air makes it absorb vapours of all kinds with the utmost avidity; and these rising to a great height are carried off by the winds either to the southward or northward, without having time to communicate any of their puerile effects. This dryness is so remarkable in the internal parts of the country, that flesh meat exposed to the open air does not putrefy even in summer, but soon becomes hard and dry like wood. In the deserts there are frequently dead carcasses thus dried in such a manner, and become so light, that one may easily lift that of a camel with one hand. In the maritime parts, however, this dryness of the air is not to be expected. They discover the same degree of moisture which usually attends such situations. At Rosetta and Alexandria, iron cannot be exposed to the air for 24 hours without rusting. According to M. Volney, the air of Egypt is also strongly impregnated with salts; for which opinion he gives the following reason. "The stones are corroded by natrum (mineral alkali), and in moist places long crys tallizations of it are to be found, which might be taken for salt-petre. The wall of the Jefuits garden at Cairo, built with earth and bricks, is every where covered with a crust of this natrum as thick as a crown-piece; and when this garden has been overflowed by the waters of the kalidj (canal), the ground after they have drained off, appears sparkling on every side with crys talls, which certainly were not brought thither by the water, as it shows no sign of salt either to the taste or by distillation."—But whatever may be the quantity of salt contained in the earth, it is certain that M. Volney's opinion of its coming thither from the air cannot be just. The salt in question is excessively fixed, and cannot be diffipated into the air without the violent heat of a glas-house furnace; and even after this has been done, it will not remain diffipated through the atmosphere, but quickly falls back again. No experiments have ever shown that any salt was or could be diffipated in the air, except volatile alkali, and this is now known to be formed by the union of two permanently elastic fluids; and it is certain that a saline air would quickly prove fatal to the animals who breathed it. The abundance of this kind of salt in Egypt therefore only shows, that by some unknown operation the heat of the sun forms it from the two ingredients of earth and water, though we do not yet understand the manner, nor are able to imitate this natural operation.

To this saline property of the earth M. Volney ascribes the excessive quickness of vegetation in Egypt, which is so great, that a species of gourd called kara will, in 24 hours, send forth shoots of four inches in length; but for the same reason, in all probability, it is that no exotic plant will thrive in Egypt. The merchants are obliged annually to send to Malta for their garden seeds; for though the plants thrive very well at first, yet if the seed of them is preferred, and sown a second year, they always come up too tall and slender.

By reason of the great dryness of the air, Egypt is exempted from the phenomena of rain, hail, snow, thunder and lightning. Earthquakes are also seldom heard of in this country; though sometimes they have been very fatal and destructive, particularly one in the year 1112. In the Delta, it never rains in summer,
summer, and very seldom at any other time. In 1767, however, such a quantity of rain unexpectedly fell, that a great number of houses, built with mud-walls, tumbled entirely down by being soaked with the water, to which they were unaccustomed. In the Higher Egypt the rain is still less frequent; but the people, sensible of the advantages which accrue from it, always rejoice when any falls, however insufficient to answer the purpose. This deficiency of rain is supplied by the inundation and dews already mentioned. The latter proceed, as has already been said, partly from the waters of the inundation and partly from the sea. At Alexandria, after sunset, in the month of April, the clothes exposed to the air and the terraces are soaked with them as if it had rained. These dews are more or less copious according to the direction of the wind. They are produced in the greatest quantity by the westerly and northerly winds, which blow from the sea; but the south and south-west winds, blowing over the deserts of Africa and Arabia, produce none.

The periodical return of winds from a certain quarter is a very remarkable phenomenon in this country. When the sun approaches the tropic of Cancer, they shift from the east to the north; and, during the month of June, they always blow from the north or north-west. They continue northerly all the month of July, varying only sometimes towards the east, and sometimes the contrary way. About the end of this month, and during the whole of August and September, they blow directly from the north, and are but of a moderate strength, though somewhat weaker in the night than in the day. Towards the end of September they return to the east, though they do not absolutely fix on that point, but blow more regularly from it than any other except the north. As the sun approaches the southern tropic, they become more variable and tempestuous, blowing most commonly from the north, north-east, and west, which they continue to do throughout the months of December, January, and February; and, during that season, the vapours raised from the Mediterranean condense into mist, or even sometimes into rain. Toward the end of February, and in the succeeding month, they more frequently blow from the south than from any other quarter. During some part of the month of March, and in that of April, they blow from the south, south-east, and south-west, sometimes from the north and east, the latter becoming most prevalent about the end of that month, and continuing during the whole of May.

It is to the long continuance of the north winds, formerly called the Etefan winds, that Egypt probably owes its extreme dryness, as well as part of the inundation by which it is fertilized. From the month of April to July, there appear to be two immense currents in the atmosphere, the under one blowing from the north, and the upper from the south. By the former the vapours are raised from the Mediterranean and southern parts of Europe, where they are carried over Abyllinia, desolating there in immense deluges of rain; while by the latter the superficial vapours, or those raised from the country of Abyllinia itself, are carried towards the upper or the north. Here the clouds coming from the south, descending into the lower part of the atmosphere, dissolve in like manner into rain, and produce an inundation of the Euphrates similar to that of the Nile, and immediately succeeding it. Mr. Bruce had an opportunity of ascertaining this fact in the month of June 1768; for at that time, while on a voyage from Sidon to Alexandria, he observed great numbers of thin white clouds moving rapidly from the south, and in direct opposition to the Etefan winds.

Besides the ordinary winds here spoken of, Egypt is visited with the destructive blasts common to all warm countries, which have deserts in their neighbourhood. These have been distinguished by various names, such as poisonous winds, hot winds of the desert, Samiel, the wind of Damascus, Kamzin, and Simoone. In Egypt they are denominated "winds of 50 days," because they most commonly prevail during the 50 days preceding and following the equinox; though, should they blow constantly during one half of that time, an universal desolation would be the consequence. Of these travellers have given various descriptions. M. Volney says, that the violence of their heat may be compared to that of a large oven at the moment of drawing out the bread. They always blow from the south; and are undoubtedly owing to the motion of the atmosphere over such vast tracts of hot sand, where it cannot be supplied by a sufficient quantity of moisture. When they begin to blow, the sky loses its usual serenity, and assumes a dark, heavy, and alarming aspect, the sun himself laying aside his usual splendor, and becoming of a violet colour. This terrific appearance seems not to be occasioned by any real haze or cloud in the atmosphere at that time, but solely to the vast quantity of fine sand carried along by those winds, and which is so excessively visible that it penetrates everywhere. The motion of this wind is always rapid, but its heat is not intolerable till it has continued for some time. Its pernicious qualities are evidently occasioned by its excessive avidity of moisture. Thus it dries and thrives up the skin; and by doing the same to the lungs, will in a short time produce suffocation and death. The danger is greatest to those of a phthisic habit of body, or who have been exhausted by fatigue; and pantation soon takes place in the bodies of such as are destroyed by it. Its extreme dryness is such, that water sprinkled on the floor evaporates in a few minutes; all the plants are withered and stripped of their leaves; and a fever is instantly produced in the human species by the suppuration of perspiration. It usually lasts three days, but is altogether insupportable if it continue beyond that time. The danger is greater when the wind blows in squalls, and to travellers who happen to be exposed to its fury without any shelter. The best method in this case is to stop the nose and mouth with a handkerchief. Camels, by a natural inclination, bury their noses in the sand, and keep them there till the squall is over. The inhabitants, who have an opportunity of retiring to their hooftes, instantly shut themselves up in them, or go into pits made in the earth, till the destructive blast be over.

The description of a blast of this kind which overtook Mr. Bruce in the desert of Nubia is still more terrible than that just given from M. Volney. We have already mentioned something of the pillars of mobile sand raised by the winds in the desert. These were observed by our traveller on this occasion in all their ter-
The inhabitants of Egypt may now be distinguished into four different races of people.

I. The Arabs, who may be subdivided into three classes. 1. The povertik of those who settled here immediately after the conquest of the country by Amrou Ebn Al As the khalif Oman's general. 2. The Magrebians, or Wofern Arabs, who at different times have migrated from the countries to the westward of Egypt, and are descended from the Saracen conquerors of Mauritania. 3. The Bedouins, or Arabs of the desert, known to the ancients by the name of Scei-tes, or dwellers in tents. The first of these classes are now found among the husbandmen and artisans; and are distinguished from the others by being of a more robust habit of body, as well as of a larger stature than the others. They are in general five feet four inches high; and many of them attain two or three inches more, and are muscular without being fleshy. Their countenances are almost black, but their features are not disagreeable; and as those of the country do not ally themselves in marriage but with the people of their own tribe, their faces have all a strong resemblance to each other. This is not the case with such as live in towns, by reason of their promiscuous marriages. The second class are more numerous in the Säid, where they have villages and even distinct sovereigns of their own. Like the former, they employ themselves in agriculture and mechanical occupations. The Bedouins pass their lives among the rocks, ruins, and water-placed places where they can find water; sometimes uniting in tribes and living in low smoky tents, and shifting their habitations from the desert to the banks of the river and back again, as best suits their convenience. Their time of inhabiting the desert is the spring; but after the inundation they take up their residence in Egypt, in order to profit by the fertility of the country. Some farm lands in the country which they cultivate, but change annually. In general, all these Bedouins are robbers, and are a great terror to travellers as well as to the husbandmen; but though their number is estimated at not less that 30,000, they are dispersed in such a manner that they cannot attempt any thing of consequence.

II. The Copts are descendants of those inhabitants of Egypt whom the Arabs subdued, and who were compoased of original Egyptians, Persians, and Greeks. M. Volney is of opinion that their name of Copts is only an abbreviation of the Greek word Agoutpions, an Egyptian. They are principally to be met with in the Säid, though some also inhabit the Delta. They have all a yellowish dusky complexion, puffed up visage, fowl eyes, flat noses, and thick lips; and in fact the exact countenance of a mulatto. M. Volney, from a view of the sphynx, and finding its features to be such as is just now described, concludes, that the ancient Egyptians were real negroes; which he thinks is likewise confirmed by a passage in Herodotus, where he concludes, that the inhabitants of Colchis were descended from the Egyptians, “on account of the blackness of their skins and frizzled hair.” M. Volney also remarks, that the countenance of the negroes is such as exactly represents that state of contraction affixed by our faces when strongly affected by heat. The eye-brows are thin, the cheeks rife, the eye-lids are contracted, and the mouth dilated; and this state of contraction to which the features of the negroes are perpetually exposed in the hot climates they inhabit, is become particularly characteristic. Excessive cold and snow produces the same effect; and hence this
The Copts profess the Christian religion, but follow the heresy of the Eucarists, where they have been persecuted by the Greeks; but having at last got the better of their adversaries, they are become the depositaries of the registers of the lands and tribes. At Cairo they are called writers, and are the intendants, secretaries, and collectors for government. The head of their chief is writer to the principal chief; but they are all hated by the Turks to whom they are slaves, as well as by the peasants whom they oppress. Their language bears a great resemblance to the Greek; but they have five letters in their alphabet, as well as a number of words in their language, which may be considered as the remains of the ancient Egyptian. These are found to bear a near resemblance to the dialects of some of the neighbouring nations, as the Arabic, Ethiopian, Syriac, Sro, and even of those who lived on the banks of the Euphrates. The language of the Copts, however, has fallen into disuse for upwards of 200 years. On the conquest of the country by the Saracen, the latter obliged the people to learn their language; and about the year 722 the use of the Greek tongue was prohibited throughout the whole of their empire. The Arabic language, however, became universal; while the others, being only met with in books, soon became totally neglected. The true Coptics, therefore, though there is a translation of the scriptures and many books of devotion written in it, is underfoot by nobody, not even the monks and priests.

III. The Turks, have the title of being masters of Egypt, but are chiefly to be met with at Cairo, where they possess the religious and military employments. Formerly they possessed also the posts under government; but these are now occupied by the fourth race of inhabitants, viz.

IV. The Mamlouks. Of the origin of these we have already given some account: we have only, therefore, to relate some of the most remarkable particulars concerning their constitution and government, manners, &c. These people, as has already been mentioned, are the real masters of Egypt; and in order to secure themselves in the possession of the country, they have taken several precautions. One of the principal of these is the degradation of the two military corps of azaba and janizaries, both of which were formerly very formidable. They have been able to effect this only in consequence of the corrupt and wretched government of the Turks; for before the revolt of Ibrahim Khaya, the Turklik troops, which ought to have consisted of 40,000, were reduced to less than half that number through the avarice and malversation of their officers. Their degradation was completed by Ali Bey; who having first displaced all the officers who gave him any umbrage, left their places vacant, and to reduced the consequence of the whole, that the azabas and janizaries are now only a rabble of vagabonds, who dread the Mamlouks as much as the meanest of the populace. The principal body of the Mamlouks reside at Cairo; but many of them are dispersed through the country, in order to keep up their authority, collect the tribute, and oppress the people; yet it should seem very easy for the Porte to dispossess them of this usurped authority, as their number is supposed not to exceed 8,500, including among these a great many youth under 20 years of age.

The Mamlouks are all horsemen; and as war is accounted the only honourable employment among them, they are reckoned disgraceful to walk on foot, none but cavalry being accounted soldiers. The other inhabitants are allowed only the use of mules and asses; and the same mark of indignity is imposed upon Europeans; though, by proper management and liberal presents, this may be got over. In the year 1776 Lord Algernon Percy, afterwards Lord Louvaine, and the earl of Charlemont, obtained permission to ride upon horseback. The Mamlouks, however, are not incited to this continual appearance on horseback merely by their supposed superiority to the rest of the inhabitants; it is rendered necessary by their drees, which is extremely unweildy and cumbersome. It consists of a wide curtain of yellowish-coloured cotton, over which is a gown of India linen, or some of the light stuffs of Damascus or Aleppo. Over this is a second covering of the same form and wideness, with sleeves reaching down to the ends of the fingers. The former covering is called antari, and the latter caftan. The caftan is usually made of silk or some finer stuff than the under garments; and both of them are fastened by a long belt, which divides the whole drees into two bundles. Over all these they have a third, named djouha, consisting of cloth without lining, and made nearly similar to the others, but that the sleeves are cut at the elbow. This coat is lined, sometimes even in summer with fur; and as if this was not sufficient, they have an outer covering called the beniche, which is the cloak or robe of ceremony; and so completely covers the body, that even the ends of the fingers are not to be seen. Thus, when the beniche and other accoutrements are on, the whole body appears like a long fack, with a bare neck and bald head covered with a turban thrust out of it. This turban is called a kaawks; and is of a cylindrical form, yellow, and turned up on the outside with a roll of muslin artificially folded up. On their feet they have a sock of yellow leather reaching up to their heels, flippers without any quarters, which consequently are always ready to be left behind in walking. Lastly, to complete this extraordinary drees, they have a kind of pantaloons or trousers, long enough to reach up to the chin, and so large that each of the legs is big enough to contain the whole body; but that they may walk more at their ease under such a number of impediments, they tie all the loose parts of their drees with a running fack. Thus swaddled (says M. Volney), we may imagine the Mamlouks are not very active walkers; and those who are not acquainted by experience with the prejudices of the different countries, will find it scarcely possible to believe that they look on this drees as exceedingly commodious. In vain we may object that it hinders them from walking, and encumbers them unnecessarily on horseback; and that in battle a horseman once dismounted is a lost man. They reply, It is the castan, and every objection is answered."

In the accoutrements of their horses, the Mamlouks are almost equally absurd. The saddle is a clumsy piece of furniture, weighing with the saddle-cloths not less than 3 E 2 than
EGY

Their arms, education &c.

In the choice of their arms they have shown themselves more judicious. Their principal weapon is an English carbine about 50 inches long; but so large in the bore, that it can discharge 10 or 12 balls at a time, which can scarce fail of doing execution even from the most unskilful hand. Besides two large pistols carried in the belt, they have sometimes a heavy mace at the bow of the saddle for knocking down their enemy; and by the shoulder-belt, they suspend a crooked fabre measuring 24 inches in a straight line from the hilt to the point, 30 at least in the curve. The reason of the preference given to the crooked blade is, that the effect of a straight one depends merely on the force with which it falls, and is confined to a small space, but that of a crooked one is continued longer by the action of the arm in retiring. The Mamlouks commonly procure their sabres from Constantinople, or other parts of Europe; but the beys rival each other in thefe of Persia and such as are fabricated of the ancient steel of Damascus. For these they frequently pay as high as 40l. or 50l. sterling; but though it must be allowed that the edge of these weapons is exquisitely keen, yet they have the defect of being almost as brittle as glass. The whole education and employment of the Mamlouks consists in the exercise of these weapons, or what is conducive to it; so that we should imagine they might at last become altogether irresistible. Every morning the greater part of them exercise themselves in a plain near Cairo, by firing their carbines and pistols in the most expeditious manner, having an earthen vessel for a mark to shoot at; and the person who breaks it is highly applauded by the boys who attend in order to encourage them. Here also they exercise themselves in the use of the sabre, as well as of the bow and arrows; though they do not any longer make use of these last in their engagements. Their favourite diversion is throwing the dervish; a word properly signifying a reed, but which is generally made use of to signify any staff thrown by the band after the manner of the Roman pilum. In this exercise they make use of the branches of the palm-tree fresh stripped. These branches, which have the form of the stalk of an artichoke, are about four feet long, and weigh five or six pounds. With these the cavaliers enter the lists, riding full speed, and throwing them afterwards at each other from a considerable distance. As soon as the assailant has thrown his weapon, he turns his horse, and his antagonist pursues in his turn. The diversion, however, frequently turns out very serious, as some are capable of throwing these weapons with force sufficient to wound their antagonists mortally. Ali Bey was particularly dexterous at this kind of sport, and frequently killed those who opposed him. All these military exercises, however, are by no means sufficient to render the Mamlouks formidable in the field. In their engagements they have neither order, discipline, nor even subordination; so that their wars are only scenes of robbery, plunder, and tumultuary encounters, which begin very often suddenly in the streets of Cairo without the least warning. If the contention happens to be transferred to the country, it is still carried on in the same manner. The strongest or most daring party pursues the other. If they are equal in courage, they will perhaps appoint a field of battle, and that without the least regard to advantages of situation, but fighting in plateaus, with the boldest champions at the head of each. After mutual defiance the attack begins, and every one chooses out his man. After discharging their fire-arms, if they have an opportunity they attack with their sabres; and such as happen to be dismounted are helped up again by their servants; but if nobody happens to be near, the servants will frequently kill them for the sake of the money they carry about them. Of late, however, the ordinary Mamlouks, who are all slaves to the rest, seem convinced that their patrons are the persons principally interested; for which reason they reasonably enough conclude that they ought to encounter the greatest dangers. Hence they generally leave them to carry on the dispute by themselves; and being always sure of finding a master who will employ them, they generally return quietly to Cairo until some new revolution takes place.

The mode of living among the Mamlouks is exceedingly expensive, as may easily be conceived from what penury has already been related. There is not one of them of living who does not cost above 100l. sterling annually, and many of them upwards of 200l. At every return of the fast of Ramadan, their masters must give them a new suit of French and Venetian clothes, with stuffs from India and Damascus. Frequently they require new horses and harnesses: most likewise have pistols and sabres from Damascus, with gilt hilts, and saddles and bridles plated with silver. The chiefs are distinguished from the vulgar by the trinkets and precious stones they wear; by riding Arabian horses of 100l. or 300l. value, wearing shawls of Calamine in value from 25l. to 50l. each, with a variety of pelisses, the cheapest of which costs above 20l. Even the European merchants have given into this kind of excessive extravagant;
Egypt. people

Anciently it was customary for the women to adorn their heads with feathers; but this is now rejected as not sufficiently expensive. Instead of these, diamonds, emeralds, and rubies, are now substituted; and to these they add French snuff and lace. In other respects the character of the Mamlouks is almost the worst that can be imagined. Without affection, tie, or connection with each other or with the rest of mankind, they give themselves up without controul to the most enormous vices; and, according to M. Volney, they are at once ferocious, perfidious, deceitful, and corrupted by every species of debauchery, not excepting even the unnatural vice; of which he says, that no further communication with the latter is necessary for the propagation of the plague; which opinion we find supported by Dr. Mead, who has endeavoured to give a natural reason why it should take its origin in this country. But it is now universally agreed, that the plague never originates in the interior parts of Egypt, but always begins at Alexandria, passing successively from thence to Rosetta, Cairo, Damietta, and the rest of the Delta. It is likewise observed, that its appearance is always preceded by the arrival of some vessel from Smyrna or Constantinople; and that, if the plague has been very violent in either of these cities, the danger to Egypt is the greater. On proper inquiry, it is found to be really a native of Constantinople; from whence it is exported by the absurd negligence of the Turks, who refuse to take any care to prevent the spreading of the infection. As they fell even the clothes of the dead without the least ceremony, and ship them laden with this pernicious commodity are sent to Alexandria, it is no wonder that it should soon make its appearance there. As soon as it has reached Cairo, the European merchants that themselves up with their families in their khanas or lodgings, taking care to have no further communication with the city. Their provisions are now deposited at the gate of the khan, and are taken up by the porter with iron tongs; who plunges them into a barrel of water provided for the purpose. If they have occasion to speak to any person, they take care to keep at such a distance as to avoid touching or even breathing upon each other. By these precautions they certainly escape the general calamity; except by accident; and it is not long ago happened that the disease was conveyed by a cat into the dwellings of the French merchants in Cairo; by which two were infected and one died. In this manner they are imprisoned for three or four months, without any other amusement than walking on their terraces in the evening, cards, or conversation with one another. There is a remarkable difference betwixt the plague at Constantinople and in Egypt. In the former, it is most violent in summer; and in the latter in winter, ending there always in the month of June. It is also remarkable, that the water-carriers of Egypt, whose backs are constantly wet from the nature of their occupation, never have the plague. It appears in Egypt every fourth or fifth year, when it makes such ravages as would depopulate the country, were it not for the vast concourse of strangers which arrive here every year from all parts of the Turkish empire.

A malady which seems in reality to be peculiar to Egypt is blindness. This is so common at Cairo, as M. Volney informs us, that out of 100 people whom he has met on the street, he might reckon 20 quite blind; ten without the sight of one eye; and 20 others with their eyes red, purulent, or blemished. Almost every one, says he, wears a fillet, a token of...
infection, and exceedingly dangerous to such as emigrate to a colder climate.

Besides these, there are two uncommon diseases met with in Egypt, viz. a cutaneous eruption which returns annually; and a swelling of the testicles, which often degenerates into an enormous hydrocele. The former comes on towards the end of June or beginning of July, making its appearance in red spots and pimples all over the body, occasioning a very troublesome itching. The cause of this diathesis, in M. Volney's opinion, is the corruption of the waters of the Nile, which towards the end of April become very putrid, as has already been observed. After this has been drunk for some time, the waters of the inundation, which are fresh and wholesome, tend to introduce some change in the blood and humours; whence a cutaneous eruption is a natural consequence.

The hydrocele most commonly attacks the Greeks and Copts; and is attributed to the quantity of oil they make use of, as well as to their frequent hot-bathing. Our author remarks, that "in Syria as well as in Egypt, constant experience has shown, that brandy distilled from common figs, or from the fruit of the sycamore tree, as well as from the dates and the fruit of the nopal, has a most immediate effect on the testicles, which it renders hard and painful the third or fourth day after it has been drunk; and if the use of it be not discontinued, the disorder degenerates into a confirmed hydrocele. Brandy distilled from dried raisins has not the same effect: this is always mixed with aniseeds; and is very strong, being distilled three times. The Christians of Syria and the Copts of Egypt make great use of it; the latter especially drink whole bottles of it at their supper. I imagined this an exaggeration; but I have myself had ocular proofs of its truth, though nothing could equal my astonishment that such excelsior do not produce instant death, or at least every symptom of the most insensible drunkenness."

In the spring season malignant fevers prevail in this country; concerning which our author mentions no remarkable particular, but that eggs are a kind of poison, and that bleeding is very prejudicial. He recommends a vegetable diet, and the bark in very large quantity.

Notwithstanding the oppression which the Egyptians suffer under, a very considerable trade is carried on of Cairo and the interior parts of Africa, by the Nile; and with Europe and theTurkish empire, by means of the Mediterranean. A caravan comes here annually from Abyssinia, bringing from 1000 to 1200 slaves, with gum, ivory, gold-dust, ostrich feathers, parrots and monkeys.

Another, which sets out from the extreme parts of Morocco, takes in pilgrims for Mecca from all that country is far south as the mouth of the river Senegal. It consists of not fewer than three or four thousand camels;
Egypt.

mels; and, passing along the coasts of the Mediterranean, collects likewise the pilgrims from Algiers, Tripoli, and Tunis, arriving at last at Alexandria by the way of the desert. Proceeding thence to Cairo, it joins the Egyptian caravan; and then setting out both together, they take their journey to Mecca, from whence they return in one hundred days; but the Moroccan pilgrims, who have still six leagues to go, are upwards of a year in returning. The commodities they bring along with them are, India stuffs, shawls, gums, perfumes, pearls, and principally coffee. Besides the profits of this merchandize, considerable sums arise from the duties paid by pilgrims, and the sums expended by them.

The caravans abovementioned are not the only means by which these commodities are brought to Cairo. They arrive also at Suez, to which port the southerly winds bring in the month of May six or eight and twenty fall of vesels from Jedd. Small caravans likewise arrive from time to time from Damascus with silk and cotton stuffs, oils, and dried fruits. During the proper season there are also a number of vesels in the road of Damietta, unloading hogsheads of tobacco from Latakia, vast quantities of which are consumed in this country. For this commodity, rice is taken in exchange; while other vesels bring clothing, arms, furs, passengers, and wrought silk from Constantinople. There are other vesels which come from Martines, Leghorn, and Venice, with cloths, cochineal, Lyons stuffs and laces, grocery ware, paper, iron, lead, Venetian sequins, and German dahlers. These are conveyed to Rosetta in bars called by M. Volney djerms, but which seem to be the same mentioned by Mr. Bruce under the name of canias, and which are particularly described by him. He informs us, that there is a peculiarity in the form of this vesel which makes it useful for navigating the river Nile; and that is, that the keel is not straight, but a portion of a parabola, whose curve is almost insensible to the eye. Hence, as sand banks are very common in the Nile, and vesels are apt to strike when they water becomes low, the middle of the canja will be aground while the extremities are afloat, and thus by means of oars and other assistance, it is always possible to get clear; but were the keel straight, this would be altogether impossible, by reason of the vast falls those vesels carry, which would urge them on with too much force to be recovered. The accommodation on board those vesels is much better than what could be expected; but they are liable to the depredations of robbers, who either swim under-water in the day time, or upon goats skins during the night; though these seldom attack any boats where there are Europeans, whom they dread on account of their skill in fire-arms.

From so many sources we need not wonder that the commerce of Cairo should be in a very flourishing state. In 1783, according to the report of the commissioner-general of the customs, it amounted to no less than 6,250,000l. but notwithstanding this show of wealth, the trade carried on at Cairo contributes very little to the enriching of the people. This will readily appear, when we consider, that great part of the coffee and other merchandise brought from India is exported to foreign countries, the value being paid in goods from Turkey and other European countries; while the country consumption consists entirely, or mostly, in articles of luxury already finished, and the produce given in return is mostly in raw materials.

Schemes have frequently been projected of enlarging the commerce of Egypt by cutting through the isthmus of Suez, and thus joining the Mediterranean and Red Seas by a canal. This is looked upon by M. Volney as impracticable. He owns, indeed, that no objection can arise from the distance, which is not more than 18 or 19 leagues; neither does any obstacle arise from mountains, or the inequality of levels, the whole being a sandy barren plain. The difficulty, which he considers as insuperable, proceeds from the nature of the corresponding coasts of the Mediterranean and Red Seas; both of which are low and sandy, where the water forms lakes, channels, and morasses, so that ships cannot come within a considerable distance of either; and it would be fearcely possible to cut a permanent canal amidst these shifting sands: not to mention, that the shore is destitute of harbours, which must be entirely the work of art. The country, besides, has not a drop of fresh water; which it would therefore be necessary to bring as far as from the Nile. The best method of effecting this junction therefore is by means of the river itself; and for this the ground is perfectly well calculated. This has been already done by several Egyptian princes, particularly Sesostris; and the canal is said to have been 170 feet wide, and deep enough for large veffels. After the Cossack conquest was renewed by the Plemecies, then by Trajan, and lastly by the Arabs. Part of it still remains, running from Cairo to the north-east of the Berket-el-Hadji, or Lake of the Pilgrims, where it loses itself. At present the commerce with Suez is only carried on by means of caravans, which set out towards the end of April or beginning of May, or in the months of July and August: waiting the arrival of the vesels, and setting out on their departure. The caravans are very numerous; that with which M. Volney travelled consisted of 5000 or 6000 men and 3000 camels. The country is as desert as barren as possible, with a single tree or the smallest leaf of verdure; so that every necessary for those who accompany the caravan must be carried on the backs of the camels, wood and water not excepted.

The custom-houses of Egypt are in the hands of the Christians of Syria. Formerly they were managed by Jews; but these were completely ruined by the extortion of Ali Bey in 1769. The Syrian Christians came from Damascus somewhat more than 50 years ago; and having by their economy and industry gained possession of the most important branches of commerce, they were at length enabled to farm the custom-houses, which is an office of great consequence. There were at first only three or four families of them; but their number has since increased to more than 500, and they are reckoned very opulent.

From what has already been said concerning the state Low of the Egyptians, we may naturally conclude, that of the arts and all kinds of learning are at a very low and learned among them. Even the most simple of the mechanical-precipitations are still in a state of infancy. The work of their cabinet-makers, gunsmiths, and locksmiths, is extremely clumsy. There are manufactures of gun-powder and sugar; but the quality of both are very indifferent. The only thing in which they can be said to arrive at any degree of perfection is the manu-
EGYPTIANS, OR GYPSES. See Gypsies.

EHRETIA, in botany: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 41st order, Aperifolia. The fruit is a bilocular berry; the seeds solitary and bilocular; the stigma emarginated.

EHIAHARIA, in botany: A genus of the monogynia order, belonging to the hexandria class of plants. The calyx is a two-valved, abbreviated, and fylligerous capsule; the corolla is a double glume, each two-valved; the exterior one compressed, and fylligerous, transversely wrinkled, and grafted at the base. There are six stamina, three on each side the pistil, in a parallel line. The stigma is simple, compressed, four-tufted, and torn at the top.

EHUD, the son of Gera, a Benjamite, a man lefthanded, who delivered Israel from the oppression of Eglon king of Moab, under whom they served for 18 years. See Eglon. It being ennemyful for the Israelites to feend a present or tribute to the king of Moab; in the year of the world 2579, being the last year of their servitude, Ehud was appointed to carry it, who having a design either to free his country from this oppression, or perfide in the attempt, had for this purpose provided himself with a dagger which had two edges, and which he had concealed on his right side. (Judges iii. 15, &c.) After he had delivered the present, pretending he had something of great importance to communicate to the king, he obtained a private audience of him; when taking his opportunity, he stabbed him with the point towards the heart, and so shutting the door after him, had time to make his escape; for as the king was a very corpulent man, his attendants supposing that he was either reposeing or eating himself, and therefore forebore to enter his apartment until Ehud was quite gone. As soon as he came to mount Ephraim, he gathered together the Israelites that lay nearest him, acquainted them with what he had done; and then securing the fords of Jordan that none of them might escape, he fell upon the Moabites, and subdued them.

EIA, or Ey, in our old writers, are used for an island. Hence the names of places ending in ey, denote them to be islands. Thus, Ramfey, the life of rams; Shenea, the life of fishes; &c.

Eia is also sometimes used for water; and hence the names of places near waters or lakes terminate in ey.

EJACULATOR, in anatomy, a name applied to two muscles of the penis, or the ejection of the seed. See Anatomy, Table of the Muscles.

EJECT., called also Elcific and Hiceter, here in the Eject of the 7th century, who made profession of the monastic life. See Hiceter.

EJECTIA, in botany: A genus of the monogynia order, and in the natural method ranking under the 41st order, Aperifolia. The fruit is a bilocular berry; the seeds solitary and bilocular; the stigma emarginated.

EJECTA, a term used by lawyers for a woman delivered or cast from the virtuous.

EJECTION, in the animal economy, evacuation, or the discharging any thing through some of the excrements, as by fchool, vomit, &c.

Ejection, in Scots law, is the turning out the possessor of any heritable subject by force; and is either legal or illegal. Legal ejection is where a person having no title to possess, is turned out by the authority of law. Illegal ejection is one person's violently turning another out of possession without lawful authority.

EJECTMENT, in English law, a writ or action which lies for the lessor for years, on his being ejected or put out of his land, before the expiration of his term, either by the lessor or a stranger. It may also be brought by the lessor against the lessee, for rent in arrears, or holding over his term, &c. Ejectment of late years is come an action in the place of many real actions, as writs of right, formodaw, &c., which are very difficult, as well as tedious and expensive; and this is now the common action for trial of titles, and recovering of lands, &c. illegally held from the right owner; yet where entry is taken away by defecants, fines, recoveries, delfells, &c., an ejectment shall not be brought; whereby we find that all titles cannot be tried by this action.

The method of proceeding in the action of ejectment is to draw up a declaration, and feign therein a lease for three, five, or seven years, to him that would try the title; and also feign a casual ejeator or defendant; and then deliver the declaration to the ejeator, who serves a copy of it on the tenant in possession, and gives notice at the bottom for him to appear and defend his title; or that he the feigned defendant will suffer judgment by default, whereby the true tenant will be turned out of possession; to this declaration the tenant is to appear at the beginning of next term by his attorney, and confent to a rule to be made defendant, instead of the casual ejeator, and take upon him the defence, in which he must confess lease, judgment, entry, and suiter, and at the trial stand upon the title only: but in case the tenant in possession does not appear, and enter into the said rule in time, after the declaration served, then, on affidavit being made of the service of the declaration, with the notice to appear as aforesaid,
the old trees, and either transplanted into a nursery for two or three years to be trained up, or into places where they are to remain. The proper time for this is in the beginning of March or early in the autumn. They should be placed where they may be screened from high winds; for they grow very freely, and are apt to be split by the wind if they are too much exposed. The third fort is too tender to endure the open air of this country; and therefore must be kept in a warm house, except during a short time in the warmest part of summer.

From the flowers of these plants an aromatic and cordial water has been drawn, which is said to have been successfully used in putrid and pestilential fevers. The genus Elaeagnus is not to be confounded with the oleaster or wild olive of Gerard, Parkinson, and Ray. The leaf is only a particular species of olive, called by Tournefort and Cæsar Banihine, olea bifolii. See OLEA.

ELAECARPUS, in botany: A genus of the monogynia order, belonging to the polyandria class of plants; and in the natural method ranking with those of which the order is doubtful. The corolla is pentapetalous and lacerated; the calyx is pentaphyllous, and the fruit is a plum, with a wrinkled kernel.

ELAETHESIUM, in antiquity, the anointing room, or place where those who were to wrestle or had bathed anointed themselves. See GYMNASIUM.

ELAIS, in botany; a genus belonging to the natural order of Palma. The male calyx is hexaphyllous; the corolla flexilis; the staminâ fix; the female calyx is hexaphyllous; the corolla hexapetalous; the stigma three; the fruit a fibrous plum, with a three-valved nut or kernel.

ELAM (anc. geog.), a country frequently mentioned in Scripture, and lying to the south-east of Shinar. In the time of Daniel (vii. 2.), Susiana seems to have been part of it; and before the captivity, it does not appear that the Jews called Persia by any other name. Elamæ and Elymais are often mentioned by the ancients. Ptolemy, though he makes Elymas a province of Media, yet he places the Elymæ in Susiana, near the sea-coast. Stephanus takes it to be a part of Affya; but Pliny and Josephus more properly of Persia, whose inhabitants this latter tells us sprang from the Elamites. The best commentators agree, that the Elamites, who were the ancestors of the Persians, were descend from Elam the son of Shem. It is likewise allowed, that the most ancient among the inspired writers constantly intant Persia, when they speak of Elam and the kingdom of Elam. Thus, not to detain the reader with unnecessary quotations, when the prophet Jeremiah (xliv. 39.), after denouncing many judgments against this country, adds these words, "But it shall come to pass in the latter days, that I will bring again the captivity of Elam, faith the Lord," he is always understood to mean the restoration of the kingdom of the Persians by Cyrus, who subdued the Babylonians, as they before had subdued the Persians.

ELAPHEBOLIA, in Grecian antiquity, a festival in honour of Dia and the hunteirs. In the celebration a cake was made in the form of a deer (♀♂), and offered to the good deities. It owed its institution to the following circumstance: When the Phocians had been severely
EHPHEBOLIUM, in Grecian antiquity, the ninth month of the Athenian year, answering to the latter part of February and beginning of March. It consisted of 30 days; and took its name from the festival elaphbolia, kept in this month, in honour of Diana the huntress, as mentioned in the preceding article.

ELASMIS, in natural history, a genus of tales, composed of small plates in form of spangles; and which, when pure and without exception, and all kinds of metallic force, be compressed into a state of elasificity. As air is that fluid in which, from the former state a force exactly proportioned to that with which they were at first compressed. Of this kind are all the aerial fluids without exception, and all kinds of flames raised by means of heat whether from solid or fluid bodies.

Of these, some retain thence elasificity only when a considerable degree of heat is applied to them or the substance which produces them; while others remain elastic in every degree of cold, either natural or artificial, that has yet been observed. Of the former kind are the vapours of water, spirit of wine, mercury, salt, ammoniac, and all kinds of sublimable salts; of the latter, those of spirit of salt, mixtures of vitriolic acid and iron, nitrous acid, and various other metals, and in short the different species of aerial fluids indiscriminately.

The elastic force with which any one of these fluids is endowed has not yet been calculated, as being ultimately greater than any obstacle we can put in its way. Thus, if we compress the atmospheric air, we shall find that for some little time it will easily yield to the force we apply; but every succeeding moment the resistance will become stronger, and a greater and greater force must be applied in order to compress it further. As the compression goes on, the vessel containing the air becomes hot; but no power whatever has yet been able to destroy the elasificity of the contained fluid in any degree; for upon removing the preflare, it is always found to occupy the very same space that it did before. The case is the same with aqueous steam, to which a sufficient heat is applied to keep it from condensing into water. This will yield to a certain degree; but every moment the resistance becomes greater, until at last it will overcome any obstacles whatever. An example of the power of this kind of steam we have every day in the steam engine; and the vapours of other matters, both solid and fluid, have frequently manifested themselves to be endowed with the same force. Thus the force of the vapours of spirit of wine has occasioned terrible accidents when the worm has been flopped, and the head of the still aburdly tied down to prevent an explosion; the vapours of mercury have burst an iron box; and those of salt ammonia, volatile salts, nitrous acid, marine acid, phosphorus, &c. have all been known to burst the chemical vessels which confined them with great force, in such a manner as to endanger those who stood near them. In short, from innumerable observations, it may be laid down as an un doubted fact, that there is no substance whatever capable of being reduced into a state of vapour, but what in that state is endowed with an elastic force ultimately superior to any obstacle we can throw in its way.

It hath been a kind of defideratum among philosophers to give a satisfactory reason for this astonishing power of elasificity in vapours, seemingly so little capable of accomplishing any great purpose when in an unconfined state. As air is that fluid in which, from the many experiments made upon it by the air-pump engine, the elastic property has most frequently been observed, the researchs of philosophers were at first principally directed towards it. The causes they assigned, however, were very inadequate; being founded upon a hypothesis concerning the form of the particles of the atmosphere itself, which they supposed to be either rolled up like the springs of watches, or that they consisted of a kind of elastic flakes. This was followed by another hypothesis concerning their substance, which was imagined to be perfectly elastic, and so strong that they could not be broken by any mechanical power whatsoever; and thus they thought the phenomenon of the elasificity of the air might be explained. But an insuperable difficulty still attended their scheme, notwithstanding both these suppositions; for it was observed, that the elasific power of the air was augmented not only in proportion to the quantity of prefire it was made to endure, but in proportion to the degree of heat applied to it at the time. Sir Isaac Newton was aware of this difficulty; and justly concluded, that the phenomena of the air's elasificity could not be solved by any other supposition but that of a repulsive power diffused all around each of its particles, which became stronger as they approached, and weaker as they removed from each other. Hence the common phenomena of the air pump and condensing-engine received a satisfactory explanation; but still it remained to account for the power shown in the present cafe by heat, as it could not be denied that this element had a very great share in augmenting the elasificity of the atmosphere, and seemed to be the only cause of elasificity in other vapours. It does not appear that Sir Isaac entered into this question, but contented himself with attributing to heat the property of
increasing repulsion, and ascribing this to another un- 
explored property called rarefaction. Thus matters 
follow till the great discovery made by Dr. Black, 
that some bodies have the power of absorbing in an 
unknown manner the element in question, and parting 
with it afterwards, so that it flows out of the body 
which had absorbed it with the very same properties 
that it had before the absorption. Hence many pheno- 
mena of heat, vapour, and evaporation, were explai- 
ned. For instance, that remarkable property of metals becoming hot by only the 
action of the sun; during which operation, in the Doctor's 
opinion, the element of heat is squeezed out from between 
the particles of the metal as water is from the 
pores of a sponge by pressing it between the fingers. 
Of the same nature is the phenomenon abovementi-
ned, that air when violently compressed becomes hot, 
by reason of the quantity of more subtle element 
squeezed out from among the particles. In this man- 
ner it appears that heat and the repulsive power of Sir 
Isaac Newton are the very same; that by diminishing 
the heat of any quantity of air, its elasticity is effect- 
ually diminished, and it will of itself shrink into a 
smaller space as effectually as by mechanical pressure. 
In one case we have what may be called occular de- 
monstration of the truth of this doctrine, viz. that 
by throwing the focus of a strong burning lens upon a 
small quantity of charcoal in vacuo, the whole will be 
converted into inflammable air, having even a greater 
power of elasticity than common air in an equal degree 
of heat. Here there is nothing else but heat or light 
to produce the elastic power, or cause the particles of 
charcoal which before attracted now to repel each other. 
In another case we have evidence equally strong, that 
the element of heat by itself, without the presence of 
that of light, is capable of producing the same effect. 
Thus when a phial of ether is put into the receiver of 
an air-pump, and surrounded by a small vessel of water, 
the ether boils violently, and is diffipated in vapour, 
while the water freezes, and is cooled to a great de- 
gree. The diffusion of this vapour shows that it has 
an elastic force; and the absorption of the heat from 
the water flows, that this element not only produces 
the elasticity, but actually enters into the substance of the 
vapour itself; so that we have not the least reason 
to conclude that there is any other repulsive power by 
which the particles are kept at a distance from one 
another than the substance of the heat itself; for 
what manner it acts we cannot pretend exactly to 
explain, without making hypotheses concerning the 
form of the minute particles of matter, which must al- 
ways be very uncertain. All known phenomena, how- 
ever, concur in rendering the theory just now laid down 
extremely probable. The elasticity of the steam of 
water is exactly proportioned to the degree of heat 
which flows into it from without; and if this be kept 
up to a sufficient degree, there is no mechanical prej- 
sure which can reduce it into the state of water. This, 
however, may very easily be done by abstracting a cer- 
tain portion of the latent heat it contains when the 
estatic vapour will become less dense and heavy fluid. 
The same thing may be done in various ways with the 
permanently elastic fluids. Thus the purest deposited 
glutinated air, when made to part with its latent heat 
by burning with iron, is converted into a gravitating 
substance of an unknown nature, which adheres strongly 
to the metal. If the decomposition is performed 
by means of inflammable air, both together unite in- 
side an heavy, aqueous, or solid fluid: if by mixture 
with nitrous air, till the heat is discernible, though less 
vigorous than in the two former cases. The decom- 
position indeed is slower, but equally complete, and the 
dephtloglutinated air becomes part of the nitrous acid, 
from which it may be again expelled by proper means: 
but of these means heat must always be one; for thus 
only the elasticity can be restored, and the air be re- 
covered in its proper state. The same thing takes 
place in fixed air, and all other permanently elastic 
fluids capable of being absorbed by others. The 
conclusion therefore which we can only draw from what 
data we have concerning the composition of elastic va- 
pours is, that all of them are formed of a terrestrial 
substance, united with the element of heat in such a 
manner that part of the latter may be squeezed out from 
among the terrestial particles; but in such a manner, 
that as soon as the preture is taken off, the surroun- 
ding fluid rushes in, and expands them to their original 
bulk: and this expansion or tendency to it will be in- 
creased in proportion to the degree of heat, just as the 
expansion of a sponge would be exceedingly augment- 
ed, if we could contrive to convey a stream of water 
into the heart of it, and make the liquid to flow out with 
violence through every pore in the circumference. In 
this case, it is evident that the water would act as a 
power of repulsion among the particles of the sponge, 
as well as the fire does among the particles of the water, 
charcoal, or whatever other substance is employed. 
Thus far we may reason from analogy; but in all prob- 
ability the internal and essential texture of these va- 
pours will for ever remain unknown. Their obvious 
properties, as well as some of their more latent opera-
tions in many cases, are treated of under a variety of 
articles in this work, as Aerology, Evaporation, 
Volcano, &c.

It has been imagined by some, that the artificial 
estatic fluids have not the same mechanical property 
with common air, viz. that of occupying a space in- 
versely proportional to the weights with which they 
are pressured; but this is found to be a mistake. All of 
them likewise have been found to be non-conductors 
of electricity, though probably not all in the same de- 
gree. Even aqueous vapour, when intimately mingled 
with any permanently elastic fluid, refuses to conduct 
this fluid, as is evident from the highly electric state 
of the atmosphere in very dry weather, when we are 
certain that aqueous vapour must abound very much, 
and be intimately mixed with it. The colour of the 
electric spark, though it may be made visible in all 
kinds of permanently elastic vapours, is very different 
in different fluids. Thus in inflammable and alkaline 
air it is red or purple, but in fixed air it appears 
white.

ELASTICITY, or Elastic Force, that property 
of bodies wherewith they restore themselves to their 
former figure, after any external pressure. 

The cause or principle of this important property 
estaticity, or springiness, is variously assigned. The 
Cartesians account for it from the materia subtilissima 
making an effort to pass through pores that are too nar-
ELASTICITY, row for it. Thus, say they, in binding, or compressing a hard elastic body, e. g. a bow, its parts recede from each other on the convex side, and approach on the concave: consequently the pores are contracted or straitened on the concave side; and if they were before round, are now, for instance, oval: so that the matter subtilis, or matter of the second element, endeavouring to pass out of those pores thus straitened, must make an effort, at the same time, to restore the body to the state it was in when the pores were more patent and round, i.e. before the bow was bent: and in this consists its elasticity.

Other later and more wary philosophers account for elasticity much after the same manner as the Cartesian; with this only difference, that in lieu of the subtilis matter of the Cartesian, these substitute Ether, or a fine ethereal medium that pervades all bodies.

Others, setting aside the precarious notion of a matter subtilis, account for elasticity from the great law of nature, attraction, or the cause of the cohesion of the parts of solid or firm bodies. Thus, say they, when a hard body is struck or bent, so that the component parts are moved a little from each other, but not quite disjointed or broke off, or separated so far as to be out of the power of that attracting force whereby they cohere, they must certainly on the excitation of the external violence, spring back to their former natural state.

Others resolve elasticity into the prehens of the atmosphere; for a violent tension, or compression, tho' not so great as to separate the constituent particles of bodies far enough to let in any foreign matter, must yet occasion many little vacuola between the separated surfaces; so that upon the removal of the force they will close again by the pressure of the aerial fluid on the external parts. See Atmosphere.

Lastly, others attribute the elasticity of all hard bodies to the power of restitution in the air included within them: and so make the elastic force of the air the principle of elasticity in all other bodies.

The Elasticity of Fluids is accounted for from their particles being all endowed with a centrifugal force: when Sir Isaac Newton, prop. 23, lib. 2. demonstrates, that particles, which naturally avoid or fly off from one another, by such forces as are reciprocallly proportioned to the distances of their centre, will compose an elastic fluid, whose density should be proportioned to its compression; and vice versa, if any fluid be compos'd of particles that fly off and avoid one another, and hath its density proportionall to its compression, then the centrifugal forces of those particles will be reciprocallly as the distances of their centres.

Elasticity of the Air, is the force witherwhere that element dilates itself, upon removing the force whereby it was before comprized. See Air and Atmosphere.

The elasticity or spring of the air was first discovered by Galileo. Its existence is proved by this experiment of that philosopher: An extraordinary quantity of air being introduced by means of a syringe into a glass or metal ball, till such time as the ball, with this accession of air, weigh considerably more in the balance than it did before; upon opening the mouth thereof, the air rushes out, till the ball sink to its for. Elasticy. weight. From hence we argue, that there is just as much air gone out as compressed air had been crowded in. Air, therefore returns to its former degree of expansion, upon removing the force that comprized or restituted its expansion; consequently it is endowed with an elastic force. It must be added, that as the air is found to rush out in every situation or direction of the orifice, the elastic force acts every way, or in every direction.

The elasticity of the air makes a considerable article in Pneumatics.

The cause of the elasticity of the atmosphere hath been commonly ascribed to a repulsion between its particles; but this can give us only a very slight idea of the nature of its elasticity. The term repulsion, like that of attraction, requires to be defined; and in all probability will be found in most cases to be the effect of the action of some other fluid. Thus, we find, that the elasticity of the atmosphere is very considerably affected by heat. Supposing a quantity of air heated to such a degree as is sufficient to raise Fahrenheit's thermometer to 92°, it will then occupy a considerable space. If it is cooled to such a degree as to sink the thermometer to 0°, it will shrink up into less than half the former bulk. The quantity of repulsive power therefore acquired by the air, while paling from one of these states to the other, is evidently owing to the heat added to or taken away from it. Nor have we any reason to suppose, that the quantity of elasticity or repulsive power it still possesse is owing to any other thing than the fire contained in it. The supposing repulsion to be a primary cause independent of all others, hath given rise to many erroneous theories, and been one very great mean of embarassing philosophers in their accounting for the phenomena of Electricity.

ELATE, in botany, a genus belonging to the natural order of Palmae. There is no male calyx; the corolla is tripetalous, with three flamina. There is no female calyx; the corolla is tripetalous, with one pistil; the fruit is an oval acuminated plum.

ELATERUM, in zoology; a genus of insects, belonging to the order of coleoptera. The antennae are fercercous; and an elastic spring or spine projects from the hinder extremity of the breast or under side of the thorax. By means of this kind of spring, the animal when turned upon his back, contrives to leap up into the air, and do turn itself. It varies in size; and when the insect is young and newly metamorphosed, its elytra are of a beautiful deep red; but in a few days they change to a much darker hue; and are nearly of a cheflnut colour. In the state of larvæ it inhabits the trunks of decayed trees, and is there transformed. With the help of its wings it flies from its prifon, flutters upon flowers, wanders over the fields, and conceals itself in thickets or under the bark of trees.

ELATERIUM, in botany: a genus of the monandria order, belonging to monacca clafs of plants; and in the natural method ranking under the 34th order, Coreubiaceæ. There is no male calyx; the corolla is falver-shaped; there is no female calyx; the corolla falver-shaped; the capitate inferior, unilocular, and bivalved.
ELEATHER, or ELOTH, a part of Idumea, situated upon the Red Sea, which David in his conquest of Edom took (2 Sam. viii. 14.), and there established a trade to all parts of the world. His son, we fee, built ships in Elath, and sent them thence to Ophir for gold, 2 Chr. viii. 17, 18. It continued in the possession of the Edomites about 150 years, till in the time of Joram, the Edomites recovered it (2 Kings viii. 20.), but it was again taken from them by Azariah, and by him left to his son, 2 Kings xiv. 22. His grandson Ahaz, however, lost it again to the king of Syria (2 Kings, xvi. 6.), and the Syrians had it in their hands a long while, till after many changes under the Ptolemies, it came at length into the possession of the Romans.

ELATINE, in botany: A genus of the tetragynia order, belonging to the ochnacia clafs of plants; and in the natural method ranking under the 17th order, Iundaete. The calyx is tetraphyllous; the petals four; the capsule quadrilocular, quadrivalved, and depressed.

ELATOSTEMA, in botany: A genus of the pentandria order, belonging to the moneca clafs of plants. The male flowers have no calyx; the corolla is quinquepartite; the stamina are five filaments. There are female flowers on the same plant; these have no calyx nor corolla; the pericarpium is a very small oblong, bivalve, monosperme capsule: the seeds single and egg-shaped.

ELBE, a large river in Germany, which, rising on the confines of Sileia, runs through Bohemia, Saxony, and Brandenburg; and afterwards dividing the duchy of Luxemburg from that of Mecklenburg, and also the duchy of Bremen from Holstein, it falls into the German ocean, about 70 miles below Hamburg. It is navigable for great ships higher than any river in Europe.

ELBING, a city of Prussia, in the palatinate of Marienburg, situated in E. Long. 20° 0. N. Lat. 54° 15', on a bay of the Baltic sea, called the Frischafliff, near the mouth of the Vibula. The town is large, populous, and very well built. It is divided into two parts, called the old and new town, which are both of them very well fortified. The old town has a handsome tower, with a good college. The fladhouse and the academy are good buildings, with pleasant gardens, which are worth seeing. The place has a considerable trade, especially in sturgeon, mead, cheese, butter, and corn. It is seated in a champagne fevel like Holland, very fruitful and populous. The inhabitants are partly Lutherans and partly Roman Catholics. The Boors in the neighbourhood have as good houses and apparel almost as the nobility of Courland.

ELBOW, the outer angle made by the flexure or bend of the arm. That eminence whereon the arm rests, called by us elbow, is by the Latins called cubitus, and by the Greeks αυθη, and by others ρηκακαυ.

Elbow is also used by architects, masons, &c., for an obtuse angle of a wall, building, or road, which diverits it from its right line.

ELCEFAITYS, in church history, ancient heretics, who made their appearance in the reign of the emperor Trajan, and took their name from their leader I.
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ELECTION, in botany. See INULA.

The jealous of this would in no mean a qualification of points, I. The qualifications of the usurpation or legislative body, which is the declaration of the people's choice; for in a democracy there can be no exercise of sovereignty but by suffrage, and other officers, who are chosen, but not yet company or community, which makes the choice; when a person makes it. And the Athenians were so jealous of this prerogative, that a stranger, who interfered in the assemblies of the people, was punished by their laws with death; because such a man was esteemed guilty of high treason, by usurping those rights of sovereignty to which he had no title. In Britain, where the people do not debate in a collective body, but by representation, the exercise of this sovereignty consists in the choice of representatives. The laws have therefore very strictly guarded against usurpation or abuse of this power, by many salutary provisions; which may be reduced to these three points, 1. The qualifications of the electors. 2. The qualifications of the elected. 3. The proceedings at elections.

(1.) As to the qualifications of the electors. The true reason of requiring any qualification, with regard to property, in voters, is to exclude such persons as are in no mean a nation, that they are esteemed to have no will of their own. If these persons had votes they would be tempted to dispose of them under some undue influence or other. This would give a great, an Election, artful, or a wealthy man, a larger share in elections than is consistent with general liberty. If it were probable that every man would give his vote freely, and without influence of any kind; then, upon the true theory and genuine principle of liberty, every member of the community, however poor, should have a vote in electing those delegates to whose charge is committed the disposal of his property, his liberty, and his life. But since that can hardly be expected in persons of indigent fortunes, or such as are under the immediate domination of others, all popular states have been obliged to establish certain qualifications: whereby some, who are suspected to have no will of their own, are excluded from voting; in order to let other individuals, whose will may be supposed independent, more thoroughly upon a level with each other.

And this constitution of suffrages is framed upon a wiser principle, with us, than either of the methods of voting, by centuries or by tribes, among the Romans. In the method by centuries, instituted by Servius Tullius, it was principally property, and not numbers, that turned the scale; in the method by tribes, gradually introduced by the tribunes of the people, numbers only were regarded, and property entirely overlooked. Hence the laws passed by the former method had unusually too great a tendency to agrandize the patricians or rich nobles: and the latter had too much of a levelling principle. Our constitution pleads between the two extremes. Only such are entirely excluded as can have no will of their own; there is hardly a free agent to be found, but what is entitled to a vote in some place or other in the kingdom. Nor is comparative wealth, or property, entirely disregarded in elections; for though the richest man has only one vote at one place, yet, if his property be at all diffused, he has probably a right to vote at more places than one, and therefore has many representatives. This is the spirit of our constitution: not that we affect it is fact quite so perfect as we have endeavoured to describe it; for if any alteration might be suggested in the present form of parliaments, it should be in favour of a more complete representation of the people.

But to return to the qualifications; and first those of electors for knights of the shire. 1. By statute 8 Hen. VI. c. 7. and 10 Hen. VI. c. 2. (amended by 14 Geo. III. c. 38.) the knights of the shire shall be chosen of people, whereof every man shall have freehold to the value of forty shillings by the year within the county; which (by subsequent statutes) is to be clear of all charges and deductions, except parliamentary and parochial taxes. The knights of shires are the representatives of the landholders, or landed interests of the kingdom; their electors must therefore have estates in lands or tenements within the county represented. These estates must be freehold, that is, for term of life at least; because beneficial leases for long terms of years were not in use at the making of these statutes, and copyholders were then little better than villeins, absolutely dependent upon their lords. This freehold must be of 40 shillings annual value; because that sum would then, with proper industry, furnish all the necessaries of life, and render the freeholder, if he pleased, an independent man: For Bishop Fleetwood, in
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In his chronicon posthumum, written at the beginning of the present century, has fully proved 40 shillings in the reign of Henry VI. to have been equal to 12 pounds 10 shillings in the reign of Queen Anne; and as the value of money is very considerably lowered since the bishop wrote, we may fairly conclude, from this and other circumstances, that what was equivalent to 12 pounds in his days, is equivalent to 20 at present. The other

(a) 7 and 8 Will. III. c. 25. 10 Ann. c. 23. 2 Geo. II. c. 21. 18 Geo. II. c. 18. 31 Geo. II. c. 14.

(b) 3 Geo. III. c. 24.
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member accepts an office under the crown, except an officer in the army or navy accepting a new commission, his feat is void; but such member is capable of being re-elected. 8. That all knights of the shire shall be actual knights, or such notable esquires and gentlemen as have estates sufficient to be knights, and by no means of the degree of yeoman. This is reduced to a still greater certainty, by ordaining, 9. That every knight of a shire shall have a clear estate of freehold or copyhold to the value of 600l. per annum, and every citizen and burgess to the value of 300l. except the eldest sons of peers and of persons qualified to be knights of shires, and except the members for the two universities: which somewhat balances the at tendance which the boroughs have gained over the counties, by obliging the trading interest to make choice of landed men: and of this qualification the member must make oath, and give in the particulars in writing, at the time of his taking his seat. But, subject to these standing restrictions and disqualifications, every subject of the realm is eligible of common right: though there are instances, wherein persons in particular circumstances have forfeited that common right, and have been declared ineligible for that parliament, by a vote of the house of commons; or for ever, by an act of the legislature. But it was an unconstitutional prohibition which was grounded on an ordinance of the house of lords, and inferred in the king’s writs, for the parliament holden at Coventry, 6 Hen. IV. that no apprentice or other man of the law should be elected a knight for the shire therein: in return for which, our law-books and historians have branded this parliament with the name of parliamentum indolatum, or the lack-learning parliament: and Sir Edward Coke observes with some spleen, that there was never a good law made thereat.

3. The third point, regarding elections, is the method of proceeding therein. This is also regulated by the law of parliament, and the several statutes referred to in the margin below, (8) all which we shall blend together, and extract out of them a summary account of the method of proceeding to elections.

As soon as the parliament is summoned, the lord chancellor (or if a vacancy happens during the sitting of parliament, the speaker, by order of the house, and without such order if a vacancy happens by death in the time of a recess for upwards of 20 days) sends his warrant to the clerk of the crown in chancery: who thereupon issues out writs to the sheriff of every county, for the election of all the members to serve for that county, and every city and borough therein. Within three days after the receipt of this writ, the sheriff is to send his precept, under his seal, to the proper returning officers of the cities and boroughs, commanding them to elect their members: and the said returning officers are to proceed to election within eight days from the receipt of the precept, giving four days notice of the same: and to return the persons chosen, together with the precept, to the sheriff.

But elections of knights of the shire must be proceeded to by the sheriffs themselves in person, at the next county-court that shall happen after the delivery of the writ. The county-court is a court held every month or oftener by the sheriff, intended to try little causes not exceeding the value of 40s. in what part of the county he pleases to appoint for that purpose: but for the election of knights of the shire, it must be held at the most usual place. If the county-court fails upon the day of delivering the writ, or within six days after, the sheriff may adjourn the court and election to some other convenient time, not longer than 16 days, nor shorter than 10; but he cannot alter the place without the consent of all the candidates: and, in all such cases, 10 days public notice must be given of the time and place of the election.

And, as it is essential to the very being of parliament that elections should be absolutely free, therefore all undue influences upon the electors are illegal, and strongly prohibited. For Mr. Locke ranks it among those breaches of truth, in the executive magistrate, which according to his notions, amount to a dissipation of the government, "if he employs the force, "treasure, and offices of the society to corrupt the "representatives, or openly to pre-engage the electors, "and prefer what manner of persons shall be chosen "for the public service: for thus to regulate candidates and electors, "and new-model the ways of election, what is it (says "he) but to cut up the government by the roots and "poison the very fountain of public security?" As soon therefore, as the time and place of election, either in counties or boroughs, are fixed, all soldiers quartered in the place are to remove, at least one day before the election, to the distance of two miles or more; and not to return till one day after the poll is ended. Riots likewise have been frequently determined to make an election void. By vote also of the house of commons, to whom alone belongs the power of determining contested elections, no lord of parliament, or lord-lieutenant of a county, hath any right to interfere in the election of commoners; and, by statute, the lord warden of the five-ports shall not recommend any members there. If any officer of the excise, customes, stamps, or certain other branches of the revenue, presumes to intermeddle in elections, by persuading any voter, or difuading him, he forfeits L. 100, and is disabled to hold any office.

Thus are the electors of one branch of the legislature secur'd from any undue influence from either of the other two, and from all external violence and compulsion. But the greatest danger is that in which themselves co-operate, by the infamous practice of bribery and corruption. To prevent which it is enacted, that no candidate shall, after the date (usually called the t e f t) of the writs, or after the vacancy, give any money or entertainment to his electors, or promise to give any, either to particular persons, or to the place in general, in order to his being elected; on

(c) 7 Hen. IV. c. 15. 8 Hen. 6. c. 7. 23 Hen. VI. c. 14. 1 W. & M. ft. 1. c. 2. 2 W. & M. ft. 1. c. 7. 5 & 6 W. & M. c. 20. 7 W. III. c. 4. 7 & 8 W. III. c. 7. and c. 25. 10 & 11 W. III. c. 7. 12 & 13 W. III. c. 10. 6 Ann. c. 23. 9 Ann. c. 5. 10 Ann. c. 19. and c. 33. 2 Geo. II. c. 24. 8 G. II. c. 30. 18 Geo. II. c. 15. 19 Geo. II. c. 28. 10 Geo. III. c. 16. 11 Geo. III. c. 42. 14 Geo. III. c. 15.
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ELECTION, on pain of being incapable to serve for that place in parliament. And if any money, gift, office, employment, or reward be given, or promised to be given, to any voter, at any time, in order to influence him to give or withhold his vote, as well he that takes as he that offers such bribe forfeits L. 500, and is to be proceeded against for forging and holding any office in any corporation; unless, before conviction, he will discover some other offender of the same kind, and then he is indemnified for his own offence. The first instance that occurs of election bribery, was so early as 13 Eliz. when one Thomas Longe (being a simple man, and of small capacity to serve in parliament) acknowledged that he had given the returning officer and others of the borough for which he was chosen four pounds to be returned member, and was for that premium elected. But for this offence the borough was amerced, the member was removed, and the officer fined and imprisoned. But as this practice hath since taken much deeper and more universal root, it hath occasioned the making of acts, both of both the efficacy of which, there is nothing wanting but resolution and integrity to put them in strict execution.

Undue influence being thus guarded against, the election is to be proceeded to on the day appointed; the sheriff or other returning officer first taking an oath against bribery, and for the due execution of his office. The candidates likewise, if required, must swear to their qualification, and the electors in counties to theirs; and the electors both in counties and boroughs are also compellable to take the oath of abjuration, and that against bribery and corruption. And it might not be amiss, if the members elected were bound to take the latter oath as well as the former; which, in all probability, would be much more effectual than administering it only to the electors.

The election being closed, the returning officer in boroughs returns his precept to the sheriff, with the persons elected by the majority: and the sheriff returns the whole, together with the writ for the county and the knights elected thereto, to the clerk of the crown in chancery; before the day of meeting, if it be a new parliament, or within 14 days after the election, if it be an occasional vacancy; and this under penalty of L. 500. If the sheriff does not return such knights only as are duly elected, he forfeits, by the old statutes of Henry VI. L. 100; and the returning officer in boroughs, for a like false return, L. 40; and they are besides liable to an action, in which double damages shall be recovered, by the later statutes of King William: and any person bribing the returning officer shall also forfeit L. 300. But the members returned by him are the fitting members, until the house of commons, upon petition, shall adjudge the return to be false and illegal. The form and manner of proceeding upon such petition are now regulated by statute 10 Geo. III. c. 16. (amended by 1 Geo. III. c. 42. and made perpetual by 14 Geo. III. c. 15.), which directs the method of choosing by lot a select committee of 15 members, who are tworn well and truly severally to form, and a true judgment to give, according to the evidence.

ELECTION of Scot's Peer. See LORDS.

ELECTION of Ecclesiastical Persons. Elections for the dignities of the church ought to be free, according to the statutes of 9 Ed. II. cap. 14. If any persons, that have a voice in elections, take any reward for an election in any church, college, school, &c. the election shall be void. And if any persons of such societies resign their places to others for reward, they incur a forfeiture of double the sum; and both the parties are rendered incapable of the place. Stat. 31 Eliz. cap. 6.

ELECTION of a Verderor of the Forest (electione viridarium foreste), in law, a writ that lies for the choice of a verderor, where any of the verderors of the forest are dead, or removed from their offices. This writ is directed to the sheriff, and the verderor is to be elected by the freeholders of the county, in the same manner as coroners. New Nat. Brev. 366.

ELECTION is also the state of a person who is left to his own free will, to take or do either one thing or another, which he pleases. See LIBERTY.

ELECTION, in theology, signifies the choice which God, of his good pleasure, makes of angels or men, for the objects of mercy and grace. The election of the Jews was the choice God made of that people to be more immediately attached to his worship and service, and for the Messiah to be born of them. And thus particular nations were elected to the participation of the outward blessings of Christianity.

ELECTION also, in the language of some divines, signifies a predestination to grace and glory, and sometimes to glory only. And it has been enjoined as an article of faith, that predestination to grace is gratuitous, merely and simply to; gratis, quia gratis data. But the divines are much divided as to the point, whether election to glory be gratuitous, or whether it supposes obedience and good works, i. e. whether it be before or after the provision of our obedience. See GRACE, and REPRIEVAL.

ELECTIVE, something that is done, or passes, by election. See ELECTOR.

Some benefits are elective, others collative. Municipal offices in England are generally elective; in Spain, Venice, Poland is an elective kingdom.

ELECTIVE AtriBUTioN. See CHEMISTRY-INDEX.

ELECTOR, a person who has a right to elect or choose another to sit office, honour, &c. See ELECTION.

Elector is particularly, and by way of eminence, applied to those princes of Germany in whom lies the right of electing the emperor; being all sovereign princes, and the principal members of the empire. The electoral college, consisting of all the electors of the empire, is the most illustrious and august body in Europe. Bellarmine and Baronius attribute the institution of it to pope Gregory V. and the emperor Otto III. in the tenth century; of which opinion are the generality of historians, and particularly the canonists: however, the number of electors was unfettered, at least, till the 13th century. In 1356 Charles IV. by the golden bull, fixed the number of electors to seven; three ecclesiastics, viz. the archbishops of Mentz, Treves, and Cologne; and four seculars, viz. the king of Bohemia, count Palatine, of the Rhine, duke of Saxony, and marquis of Brandenburgh. In 1648 this order was changed, the duke of Bavaria being put in the place of the count Palatine, who having accepted the crown of Bohemia was outlawed by the emperor;
but being at length restored, an eighth electorate was erected for the duke of Bavaria. In 1692, a ninth electorate was created, by the emperor Leopold, in favour of the duke of Hanover, of the house of Brunswick-Luneburg.

There is this difference between the secular and ecclesiastical electors, that the first have an active and passive voice, that is, may choose and be chosen; the last, an active only. The three archbishops are to be 30 years old, before they can be advanced to the dignity; the seculars, 18, before they can perform the office themselves. The last have each their vicars, who officiate in their absence.

Besides the power of choosing an emperor, the electors have also that of capitulating with and deposing him; so that, if there be one suffrage wanting, a protest may be entered against the proceedings. By the right of capitulation, they attribute to themselves great privileges, as making of war, coinage, and taking care of the public interest and security of the states; and the emperor promiseth, upon oath, to receive the empire upon these conditions.

The electors have precedence of all other princes of the empire, even of cardinals and kings; and are addressed under the title of electoral highness.

Their several functions are as follow. The elector of
defends is chancellor of Germany, convokes the states, Electorate, and gives his vote before any of the rest. The elector of Cologne is grand chancellor of Italy, and confederates the emperor. The elector of Treves is chancellor of the Gauls, and confers impositions of hands upon the emperor. The count Palatine of the Rhine is great treasurer of the empire, and presents the emperor with a globe at his coronation. The elector of Bavaria is great master of the imperial palace, and carries the golden apple. The marquis of Brandenburg is grand chamberlain, and puts the ring on the emperor's finger. The elector of Saxony is grand marshal, and gives the sword to the emperor. The king of Bohemia is grand butler, and puts Charlemagne's crown on the emperor's head. Lastly, the elector of Hanover, now king of Great Britain, is arch-treasurer, the first erected under the title of standard-bearer of the empire.

Electorate, a term used as well to signify the dignity of, as the territories belonging to, any of the electors of Germany; such are Bavaria, Saxony, &c. See Elector.

Electric, derived from elektruy, "amber," in physics, is a term applied to those substances, in which the electric fluid is capable of being excited, and accumulated without transmitting it, and therefore called non-conductors. See Electricity.

Electricity,

In general, signifies the operations of a very subtle fluid, in most cases invisible, but which sometimes becomes the object of our sight and other senses, discovering itself to be one of the chief agents employed in producing the phenomena of nature.

Sect. 1. Definitions of Terms used in the Science.

Before we can enter upon this science with propriety, even so far as to give an history of its rise and progress, it seems necessary to give some explanation of the terms made use of by writers on electricity, that the reader may not be embarrassed with words whose meaning he cannot perhaps easily comprehend.

1. The foundation of all that is known upon this subject, is the difference between electric bodies and such as are not. The former may generally be distinguished by their attracting and repelling light substances, which the latter cannot be made to do. The principal electric bodies are glass, amber, sealing-wax, gum-lac, sulphur, rosin, &c. They are often called non-conductors, or electrics per se.

2. The usual way in which the electric power of any body can be discovered, is by rubbing it with some soft substance, generally woollen, silk, or fur; and, according to the strength of the electric virtue, the former body will attract and repel light substances presented to it at a greater or less distance. If the virtue is very strong, the electric body will emit sparks, or even strong flashes of fire, to a considerable distance.

In some cases electricity discovers itself by hearing the body, or blowing air upon it; but in both these ways it is much weaker than that produced by rubbing.

In whatever way this power is made to show itself, the substance possessed of it is said to be excited.

3. Conductors, called also non-electrics, are such substances as, though incapable of being excited, yet in certain circumstances convey the electric power from one body to another, and that to any imaginable distance. The best conductors are metals of all kinds, charcoal, and water.

4. Electrics, we have already observed, are also called non-conductors; and this name they have from their power of stopping the communication of the electric virtue from one body to another. Thus, though any conductor be placed properly for receiving the virtue from an excited electric, none will pass to it if any electric substances be interposed; or, if the conductor be terminated by an electric, none will pass beyond the place where the electric substance begins.

5. Inflation is when a conducting substance is placed upon an electric, so that any power communicated to it cannot pass off. It must be remembered, however, that all this is to be understood with some degree of limitation; for there is no substance either a perfect electric, or a perfect conductor; the best conductors making a sensible resistance to the passage of the fluid through them when they are very long; and the most perfect electrics transmitting some of the fluid over or through them. Indeed, though these two different kinds of substances seem to be so far removed from one another, they in reality approach to a surprizing degree; insomuch that there are many substances which can be excited as electrics, and yet have a very considerable conducting power.

6. The effects of the electric fluid discovering themselves
Electricity is found to be of two kinds; the one called negative, and the other positive. It is uncertain in what the difference between these two consists. Dr Franklin is of opinion that the former consists in a superabundance of the fluid, or when more is thrown upon any substance than it can conveniently contain; the other, when a part of it is abstracted, and the body contains less than it naturally ought to do. Other theorists suppose, that when the fluid is directed outwards from any substance, that substance will in all cases be electrified positively; and that when the fluid is either entering or has a tendency to enter into any substance, it will then be electrified negatively.—This question will be difficult in the course of electricity. The most remarkable differences we can perceive between the positive and negative electrification are that they attract each other, though strongly repulsive of themselves; that is, two bodies positively electrified, or negatively electrified, repel each other; but one body positively electrified will attract another negatively so; and if the electrification are very strong, a spark will be observed between them at meeting. These electrifications are produced naturally by exciting different substances, or by using a different rubber to the same substance. Thus, glases usually produces the positive electrification; but by using a certain kind of rubber, or altering the smoothness of its surface, it may be made to produce the negative kind. The two electrifications are sometimes called the vitreous and resinous, as well as positive and negative.

SECT. II. History of electricity.

Though it is certain that, ever since the creation of the world, the fluid we speak of hath had the same share in all the natural operations that it hath just now; yet the discovery of its action, and even of its existence, is, comparatively speaking, of a very late date. That the Miletins, who lived about one hundred years before Christ, was the first that observed the electric properties of amber. Of these, indeed, he knew no more than that this substance would attract light bodies when it was rubbed. For 300 years after his time, we hear nothing farther concerning this subject. Theophrastus then tells us, that the lycurium (the same substance now called the tournain), has the property of attracting light bodies, as well as amber. From this time, there is a chain in the history of electricity for no less than 1700 years. Indeed, it is scarce to be supposed that during this long interval any person applied himself to the investigation of the subject; as, for the greatest part of it, science of every kind was almost totally extinguished. The electrical properties of jet, however, and, according to Mr Boyle, of the agate, were some way or other discovered during the afomentioned period. But it was not till the beginning of the 17th century, that the subject of electricity became properly a distinct science, and the foundation was laid of those discoveries which have since taken place.

The first who can properly be called an electrician, was Dr William Gilbert, who, in the year 1660, wrote a book de Magnete, which contains a variety of electrical experiments. All these, however, considered only the attractive property of certain substances, which from their agreement in this respect with amber (in Latin electrum), were called electric. Dr Gilbert's negative consist in his having been at great pains to find out a number of such substances, and thus considerably enlarging the number of electrics.

Till the year 1670, it doth not appear that any farther discoveries were made; except some trifling additions to the catalogue of electrics. About this time, Mr Boyle applied himself to the study of electricity. He enlarged the catalogue of electrics; and found that their electric properties were increased by wiping and warming them before they were rubbed. He observed also, that all kinds of bodies were attracted promiscuously; and imagined that they were attracted in vacuo as well as in air. This last position, however, is denied by Mr Bore; and we shall afterwards show that Mr Boyle must necessarily have been mistaken.

He also observed the electric light, though only in the instance of some diamonds.

Otto Guericke, however, who was contemporary with Mr Boyle, improved the science much farther. He of Otto made use of a sulphur globe, whirled on an axis much in the same way with our present glass globes. Thus he could excite a vastly greater power of electricity than any of his predecessors, and try all their experiments to much more advantage. He discovered electrical repulsion; and not only saw the electric light more clearly than Mr Boyle, but heard the hissing sound which with it is emitted. He also made another remarkable discovery, but which has since been very generally overlooked; namely, that a feather, when repelled by an excited electrific, always keeps the same face towards the body which repels it, as the moon does to the earth.

The next discovery of any moment was made by Sir Isaac Newton; who observed, that the electric attraction and repulsion penetrated through glases; and it is much to be regretted that this accurate philosopher did not apply himself to the study of electricity with greater affiduity.

In 1700, a treatise was written on electricity by Mr Remarkable Hauksbee; who not only far excelled all his predecessors and cotemporaries, but also made some discoveries which well deserve the attention of the most expert electricians at this day. Besides a variety of new experiments made upon electric attraction and repulsion, as well as the light emitted by electric bodies; he found a method of rendering opaque bodies transparent by means of electricity. He lined more than half the inside of a glass globe with sealing-wax; and having exhausted the globe, he put it in motion; when applying his hand to excite it, he saw the flame and figure of all the parts of his hand distinctly considered perfectly, on the concave superficies of the wax within, just as if only pure glases without any wax at all had been interposed between his eye and his hand. The lining of wax, where it was spread the thinnest, would
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but just allow the sight of a candle through it in the dark; but in some places the wax was at least an eighth part of an inch thick. Yet, even in these places, the light and figure of his hand were as distinguishable through it as any where else. The sealing-wax did not adhere to the glass in all places; but this made no difference with regard to the transparency. Pitch answered the purpose equally well with sealing-wax.

M. Hauksbee also made a farther improvement, by using a glafs globe, which acts much more powerfully than a sulphur one. After his death, however, not only the use of glafs globes, but even the study of electricity itself, seems to have been pretty generally laid aside for some time. The reason of this was, that the recent discoveries of Sir Isaac Newton engrossed the attention of philosophers to such a degree, that they had no leisure for any thing else. After the death of that great man, however, the science of electricity began to revive; and, in 1729, a capital discovery was made by Mr Stephen Grey. The experiment consisted in the suspension between conductors and non-conductors of electricity. As the discovery was entirely accidental, and attended with several curious circumstances, we shall here give some account of it. In the month of February 1729, Mr Grey, after some fruitless attempts to excite an electric power in metals, recollected a suspicion he had for some time entertained, that as a glafs tube, when excited in the dark, communicated its light to various bodies, it might at the same time possibly communicate to them an electricity; that is, a power of attracting light bodies; which, as yet, was all that was undefined by the word electricity. For this purpose he provided himself with a glafs tube, three feet five inches long, and near one inch and two-tenths in diameter. To each end was fitted a cork; to keep the dust out when the tube was not in use. His first experiments were made with a view to determine whether the tube would attract equally well with the ends shut as with them open. In this respect there was no difference; but he found that the corks attracted and repelled light substances as well, and rather better, than the tube itself. He then fixed an ivory ball upon a stalk of fir about four inches long, and thrusting the end of the stalk into one of the corks, he found the ball endowed with a strong attractive and repulsive virtue.

The experiments were repeated in many different ways: fixing the ball upon long tacks, and upon pieces of brafs and iron wire, always with the same success; but he constantly observed, that the ball at the end attracted more vigorously than that part of the wire nearest the tube.

The inconvenience of using long wires in this manner, put Mr Grey upon trying whether the ball might be suspended by a pack-thread with a loop on the tube, with equal success; and the event fully answered his expectation. Having thus suspended bodies of the greatest length he conveniently could, to his tube, he ascended a balcony 36 feet high, and fastening a string to his tube, found that the ball would attract light bodies on the ground below. This experiment succeeded in the greatest heights to which he could ascend; after which, he attempted to carry the electricity horizontally. His first attempt miscarried, because he suspended his line, which was intended to carry the electricity horizontally, by a pack-thread; and thus the fluid got off from it: but though Mr Grey knew this was the case, he could not at any time think of any method to prevent it.

On the 30th of June 1729, Mr Grey paid a visit to Mr Wheeler, in order to give him a specimen of his experiments; but told him of his unsuccessful attempt he had made to carry the electric fluid horizontally. Mr Wheeler proposed to suspend the conducting line by silk instead of pack-thread. For this advice he could give no reason, but that the silk thread was smaller than the other: however, with it they succeeded perfectly well. Their first experiment was in a matted gallery at Mr Wheeler's house, on the 2d of July 1729. About four feet from the end of the gallery they fastened a line across the place. The middle of this line was silk, the rest pack-thread. Over the silk part they laid one end of the conducting line, to which was fastened the ivory ball, and which hung down about nine feet below the line stretched across the gallery. The conducting line was 80 feet in length, and the other end of it was fastened by a loop to the electric tube. Upon rubbing the tube, the ivory ball attracted and repelled light substances as the tube itself would have done. They next contrived to return the line, so that the whole length of it amounted to 147 feet; which also answered pretty well. But, supposing that the attraction would be stronger without doubling or returning the line, they made use of one carried straight forward for 124 feet; and, as they expected, found the attraction in this manner stronger than when the line had been doubled. Thus they proceeded with their experiments: still adding more conducting line, till at last their silk-string broke with the weight. This they endeavoured to supply, first with a small iron-wire, and then with a brass one. The result of these experiments, however, soon convinced them that the silk refused to conduct the electric fluid, not on account of its smallness, as they had supposed, but on account of some difference in the matter. The wires were smaller than the silk-thread, yet the electricity was effectually carried off by them. They had recourse, therefore, to thicker lines of silk, and thus conveyed the electric matter to the distance of 765 feet; nor did they perceive the virtue to be at all diminished by the distance to which it was carried.

This discovery of the conducting power of silk was quickly followed by a discovery of the same power in many other substances: and thus, in fact, the foundation of almost all the subsequent improvements in electricity was laid; though in the sciences, as well as in most others, few discoveries have been made by reasonings, but many by accident. Mr Grey continued to study electricity as long as he lived; and has given a full account of his experiments, of which Dr Priestley says, "It is not easy to know what to make of them." He difcovered, as he imagined, that he had discovered in all electric substances a perpetual attractive power, which required no personal state of attrition, either by heating, rubbing, or any other kind of attrition. He took 19 different substances which were either rosin, gum-lac, shell-lac, bees-wax, sulphur, pitch, or two or three of these differently compounded. These he melted in a spherical iron ladle; except the sulphur, which was best done in a glafs vessel. When these were taken out of the ladle, and their spherical surface hardened, he says they would
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would not attract till the heat was abated, or till they came to a certain degree of warmth; that there was then a small attraction, which increased till the substance was cold, when it was very considerable. The manner in which he kept these substances in a state of attraction was, by wrapping them in any thing which would preserve them from the external air. At first, for the smaller bodies he used white paper, and for the larger ones white flannel; but afterwards, he found that black worsted fockings would do as well. When thus wrapped up, they were put into a large firm box, where they remained till he had occasion to use them. Thus prepared, they retained their attractive virtue for four months. These experiments are similar to some others made and published as new discoveries.

Some other experiments were made by Mr Grey, with regard to the attraction of electric bodies in vacuo; and in this he determined with Mr Boyle against the opinion of Mr Beatius abovemention. But the most remarkable experiments mentioned by Mr Grey, are his imitations of the planetary motions. I have lately made (says he) several new experiments upon the projectile and pendulous motions of small bodies by electricity; by which small bodies may be made to move about large ones, either in circles or ellipses; and those either concentric or eccentric to the centre of the large body about which they move, so as to make many revolutions about them. And this motion will constantly be the same way that the planets move about the sun, viz. from the right hand to the left, or from west to east. But these little planets, if I may so call them, move much faster in their apogee than in the perigee parts of their orbits; which is directly contrary to the motion of the planets about the sun. The manner in which these experiments were made, as delivered by him on his death-bed to Dr Mortimer, was as follows: "Place a small iron globe (said he), of an inch or an inch and a half in diameter, on the middle of a circular cake of rosin, seven or eight inches in diameter, greatly excited; and then a light body suspended by a very fine thread, five or six inches long, held in the hand over the centre of the cake, will, of itself, begin to move in a circle round the iron globe, and constantly from west to east. If the globe is placed at any distance from the centre of the circular cake, it will describe an ellipse, which will have the same eccentricity as the distance of the globe from the centre of the cake. If the cake of rosin be of an elliptical form, and the iron globe be placed in the centre of it, the light body will describe an elliptical orbit of the same eccentricity with the form of the cake. If the globe be placed in or near one of the foci of the elliptical cake, the light body will move much swifter in the apogee than in the perigee of its orbit. If the iron globe is fixed on a pedestal an inch from the table, and a glass hoop, or a portion of a hollow glass cylinder excited, be placed round it, the light body will move as in the circumstances mentioned above, and with the same varieties." He said, moreover, that the light body would make the same revolutions, only smaller, round of the iron globe placed not far from the cake, without any electrical body to support it: but he acknowledged that he had not found the experiment succeed if the thread was supported by any thing but a human hand, though he imagined any other animal substance would have answered the purpose.

These experiments occasioned a great deal of speculation. Dr Mortimer was the only person who was able to repeat them with success, and he only when nobody but himself was present. It was therefore generally supposed that both he and Mr Grey had been deceived: but from some experiments to be related hereafter, it seems probable that the successes of Mr Grey and Dr Mortimer was owing to their having performed their experiments with candle-light; and the failure of the others to their having attempted them by day-light. Notwithstanding which, it is more than probable that Mr Grey has been deceived in a number of particulars; for no motion can be performed by an artificial excitation of the electric fluid, but what is attended with much irregularity.

Some soon after Mr Grey's discovery of the difference between conductors and non-conductors of electricity, and reflex electric electricity discovered by Mr Du Fay, observed that a piece of leaf-gold, repelled by an excited glass tube, and which he meant to place about the room with a piece of excited gum copal, instead of being repelled by it as it was by the glass tube, it was eagerly attracted. The same was the case with sealing-wax, sulphur, rosin, and a number of other substances. He discovered also, that it was impossible to excite a tube in which the air was condensed.

In the year 1742, the use of glass globes was again introduced by Mr Bofe, professor of philosophy at Wittenburgh, though some attribute this to Christian Augustus Hanfén, professor of mathematics at Leipzig. He added also a prime conductor, which consisted of a tube of iron or tin. It was at first supported by a man standing upon cakes of rosin; but afterwards suspended by silk lines horizontally before the globe. A bundle of thread was put into the end next to the globe, which not only prevented any injury to the glass, but rendered the electricity stronger.

The most remarkable discovery that hath yet been made in the science of electricity, was in the end of the year 1745, and beginning of 1746. This was the method of giving the electric shock, or the accumulation of the power of electricity in a vial. This had its name of the Leyden vial, from Mr Cunæns, a native of Leyden, who exhibited it as he was repeating some experiments made by Messrs Mushchenbroek and Allamand, professors in the university of that city. He was not, however, the inventor. The merit of this discovery (if any merit can arise from a discovery made by accident) belongs to Mr Van Kleff, dean of the cathedral at Camin. On the 4th of November 1745, he sent the following account of it to Dr Leibekuhen at Berlin: "When a nail, or a piece of thick brass wire, &c. is put into a small apothecary's vial, and electrified, remarkable effects follow: but the vial must be very dry, or warm. I commonly rub it over before-hand with a file, and then put in a piece of chalk. If a little mercury or a few drops of spirit of wine are put into it, the experiment succeeds the better. As soon as this phial and nail are removed from the
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the electrifying glass, or the prime conductor to which it hath been exposed is taken away, it throws out a pencil of flame so long, that with this burning machine in my hand, I have taken above 60 steps in walking about my room. When it is electrified strongly, I can take it into another room, and there fire spirits of wine with it. If while it is electrifying, I put my finger, or a piece of gold which I hold in my hand, to the nail, I receive a shock which burns my arm and shoulders.

"A tin tube, or a man placed upon elecricities, is electrified much stronger by this means than in the common way. When I present this vial and nail to a tin tube, which I have 15 feet long, nothing but experience can make a person believe how strongly it is electrified. Two thin glasses have been broken by the shock of it."

Soon after this, a method of giving the shock was discovered in Holland by Mr Cumes, in the following manner: M. Mufchenbroek and his friends, observing that electrified bodies exposed to the common atmosphere, which is always replete with conducting particles of various kinds, soon loft their electrivity, and were capable of retaining but a small quantity of it: imagined, that, were the electrified bodies terminated on all sides by original elecricities, they might be capable of receiving a stronger power and retaining it for a longer time. Glasses being the most convenient electric for this purpose, and water the most convenient non-electric, they first made these experiments with water in glass bottles: but no considerable discovery was made, till Mr Cumes, happening to hold his glass vessel in one hand, and endeavouring to disengage it from the conductor with the other (when he imagined the water had received as much electrivity as the machine could give it), was surprised with a sudden shock in his arms and breast, which he had not in the least expected.

The discovery of such a terrible effect of the electric power immediately railed the attention of all the philosophers in Europe. Many of them greatly exeugated their accounts: either from a natural timidity, or their love of the marvellous. Mr Mufchenbroek, who tried the experiment with a very thin glass bowl, told Mr Reamur in a letter written soon after the experiment, that he felt himself struck in his arms, shoulder, and breast, so that he lost his breath; and was two days before he recovered from the effects of the blow and the terror. He added, that he would not take a second shock for the whole kingdom of France. Mr Allamand, who made the experiment, with a common beer-glass, said, that he loft his breath for some moments; and then felt such an intense pain all along his right arm, that he was apprehensive of bad consequences, but it soon went off without any inconvenience, &c. Other philosophers, on the contrary, showed their heroism and magnanimity, by receiving a number of electric shocks as strong as they could possibly make them. Mr Bose above-mentioned, wished that he might die by the electric shock, in order to furnish, by his death, an article for the memoirs of the academy of sciences at Paris. "But (adds Dr Priestley, from whom this account is taken), it is not given to every electrician to die in so glorious a manner as the justly envied Richman." From the time of this discovery, electricity became the general subject of conversation. A great number of people all over Europe got their livelihood by going about and showing the phenomena of it; and, at the same time, the pelflon for the marvellous strongly discovered itself in some effects of electricity, pretended to be found out in Italy and Germany. It was ascertained by Signior Pivati at Venice, and after him by Verati at Bologna, Mr Blanchi at Turin, and Mr Winckler at Leipzig, that if odoriferous substances were confined in glass vessels, and the vessels excited, the odours and other medicinal virtues would transpire through the glass, infect the atmosphere of the conductor, and communicate the virtue to all persons in contact with it: also, that those substances, held in the hands of persons electrified, would communicate their virtues to them; so that the medicines might be made to operate without being taken into the stomach. They even pretended to have wrought many cures by the help of electricity applied in this way. To fee the wonderful effects of these medicated tubes, as they were called, Mr Nollet travelled into Italy, where he visited all the gentlemen who had published any account of these experiments. But tho' he engaged them to repeat their experiments in his presence, and upon himself; and though he made it his business to get all the information he could concerning them; he returned fully convinced, that in no instance had odours been found to transpire through the pores of excited glass, and that no drugs had ever communicated their virtues to people who had only held them in their hands while they were electrified. He was convinced, however, that by continued electrification without drugs, several persons had found considerable relief in various disorders; particularly, that a paralytic person had been cured at Geneva, and that one who was deaf in an ear, another who had a violent pain in his head, and a woman with a disorder in her eyes, had been cured at Bologna: so that from this time we may date the introduction of electricity into the medicinal art. See Medicine-Index.

Another wonderful experiment was the beatification of Mr Boze; which other electricians, for a long time endeavoured to repeat after him, but to no purpose. His description of this remarkable experiment was, that if, in electrifying, large globes were employed, and the electrified person stood upon large cakes of pitch, a lambent flame would by degrees arise from the pitch, and spread itself around his feet; that from thence it would be propagated to his knees and body, till at last ascended to his head; that then, by continuing the electrification, the person's head would be surronded by a glory such as is in some measure represented by painters in their ornamenting the heads of saints. Dr Watson took the utmost pains to repeat this experiment. He underwent the operation several times, and was supported during the time of it by solid electrics three feet high. Being electrified very strongly, he felt a kind of tingling on the skin of his head and many other parts of his body. The sensation resembled what would arise from a vast number of insects crawling over him at the same time. He constantly observed the sensation to be the greatest in those parts of his body which were nearest to any non-electric; but no light appeared upon his head, though the experiment was several times made in the dark, and with some continuance. At last the Doctor
A pretty loud clap of thunder. Immediately he ran to
the machine, taking with him a phial furnished with a
brazs wire; and presenting the wire to the end of the
rod, a small spark issued from it with a snap like that
which attends a spark from an electrified conductor.
Stronger sparks were afterwards drawn in the presence
of the curate and a number of other people. The curate's account of
that, they were of a blue colour, an inch and a half in length, and
fiicted strongly of sulphur. In making them, he received a
stroke on his arm a little below the elbow; but he
could not tell whether it came from the brazs wire
inserted into the phial, or from the bar. He did not
attend to it at the time; but the pain continuing,
covered his arm when he went home in the presence of
Coiffier. A mark was perceived round it, such as
might have been made by a blow with the wire on his
naked skin.

About a month after this, Dr Franklin himself had
an opportunity of verifying his own hypothesis. He
was waiting for the erection of a spire in the city of
Philadelphia, not imagining that a pointed rod of a
moderate height could answer the purpose. At half
occurred to him, that by means of a common kite he
could have a readier access to the higher regions of
the atmosphere than any other way whatever. Preparing,
therefore, a large silk handkerchief and two crofs
flicks of a proper length on which to extend it, he
took the opportunity of the first approaching thunder-
storm to take a walk into a field where there was a field
convenient for his purpose. But dreading the ridicule
which too commonly attends unsuccessful attempts in
science, he communicated his intention to nobody
but his son, who affifted him in riUng the kite. A con-
siderable time elapsed before there was any appearance
of success. One very promising cloud had pail over
the kite without any effect; when, just as he was
beginning to despair, he observed some loose threads of
the hemp string to stand erect and avoid one another,
jus as if they had been affifted by the conductor
of a common electrical machine. On this he pre-
ferred his knuckle to a key which was faftened to the
string, and thus obtained a very evident electric spark.
Others succeeded even before the string was wet; but
when the rain had begun to descend, he collected
electric fire pretty copiously. He had afterwards an
infalated iron rod to draw the lightning into his house;
and performed almoft every experiment with real
lightning that had before been done with the artificial
representations of it by electrical machines.

Thus a new field was opened for philosophers; but Danger or
it was soon found, that experiments of this kind were making ex-
not always to be made without danger. This very year, 1752, the Abbé Nollet published some cautions
with lightning.

In the year 1752, the Abbé Nollet published some precautions
with those who tried experiments on lightning. He had
been informed by letters from Florence and Bologna,
that some people there had received violent shocks
while they drew sparks from an iron bar electrified by
thunder. One of his correspondents informed him,
thaf, once, as he was endeavouring to affift a small
chain with a copper ball at one of its extremities to
a great chain which communicated with the bar at the
moment of the building, there came a flash of lightning
which he did not fee, but which affected the latter
with a noise like that of wild-fire. The observer in-

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ELECTRICITY

Sect. III.

History.

16

Professor
Richman
killed by
lightning.

The great instance of the danger of these experiments, however, was the death of Mr Richman professor at Peterburgh aforesaid. This happened on the 6th of August 1753, as he was making experiments on lightning drawn into his own room. He had provided himself with an instrument for measuring the quantity of electricity communicated to his apparatus; and as he stood with his head inclined to it, Mr Sokolow an engraver, who was near him, observed a globe of blue fire, as big as his fist, jump from the instrument, which was about a foot distant, to Mr Richman’s head. The professor was instantly dead, and Mr Sokolow was also much hurt. The latter, however, could give no particular account of the way in which he was affected; for, at the time the professor was struck, there arose a fort of splitting through, and the door torn off and thrown into the room. They opened a vein in the body twice, but without effect; after which, they endeavoured to uncover the head. The reason of this variety was, in the first place, that the electrical matter having entered at the head, made its way out again at the foot. Upon the body, particularly on the left side, were several red and blue spots resembling leather shrunk by being burnt. Many more also became visible over the whole body, and particularly over the back. That upon the forehead changed to a brownish red, but the hair of the head was not singed. In the place where the shoe was unripped, the flocking was entire; as was the coat every where; the waistcoat only being singed on the forepart where it joined the hinder; but there appeared on the back of Mr Sokolow’s coat long narrow tears, as if red-hot wires had burned off the nap, and which could not well be accounted for.

When the professor’s body was opened next day, the cranium was very entire, having neither fissure nor contra-fissure; the brain was found; but the transparent pellicles of the wind-pipe, were excessively tender, and easily rent. There was some extravasated blood in it, as also in the cavities below the lungs. Those of the breast were quite found; but those towards the back of a brownish black colour, and filled with more of the blood above-mentioned. The throat, the glands, and the small intestines, were all inflamed. The tinged leather-coloured spots penetrated the skin only. In 48 hours the body was so much corrupted that they could scarce get it into a coffin.

Since the discovery of the identity of lightning and the electric matter, long rods of iron or other metal have been made use of with a view to protect buildings from the danger of strokes of lightning. A considerable dispute has been carried on whether these rods ought to be pointed or not; but a committee of the royal society have very lately determined it in favour of the former.

For some time, the science of electricity seems to have been at a stand. Numberless improvements indeed have been made upon what was before discovered, but scarce any thing new hath been added. The only thing which can properly be reckoned a new discovery is that of the electrificus by Signior Volta an Italian; which on many accounts may be reckoned the most surprising machine hitherto invented.

Sect. III. Of the Apparatus, necessary for exciting Electricity, and communicating it to other Bodies, &c.

The instruments most in use for this purpose are those called electrical machines, of which there has been so many different forms, that it would be tedious and difficult to give only a very short description of them all. We shall therefore first lay down the most necessary rules for constructing electrical machines in general; and then give a particular description of those machines which are most generally useful, and contain all the improvements hitherto made.

§ 1. Of the Construction of Electrical Machines.

The principal parts of the machine are the electric, the moving engine, and the prime conductor, i. e. an insulated conductor, which immediately receives the electricity from the excited electric.

Formerly, different kinds of electrics were used, as what sub-glares, rosin, sulphur, sealing-wax, &c. Their forms commonly were various, as globes, cylinders, spheroids, &c. The reason of this variety was, in the first place, that it was not then ascertained what substance acted most powerfully; and secondly, in order to produce a positive or negative electricity at pleasure. At present smooth glass only is used; for when the machine has an insulated rubber, the operator may produce positive or negative electricity at his pleasure, without changing the electric. In regard to the form of the glass, those commonly used at present are globes and cylinders. The most convenient size for a globe, is from nine to twelve inches diameter. They are made with one neck, which is cemented to a strong brass cap in order to adapt them to a proper frame.

The best cement for electrical purposes is made with two parts of rosin, two of bees-wax, and one of the powder of red ochre. These ingredients are melted, and mixed together in any vessel over the fire; and afterwards kept for use. This kind of cement sticks very fast; and is much preferable to rosin only, as it is not so brittle, and at the same time inflates equally well. The cylinders are made with two necks; they are used to the greatest advantage without any axis; and their common size is from four inches diameter and eight inches long, to twelve
Section III.

Electricity.

Apparatus. Twelve inches diameter and two feet long, which are perhaps as large as the workmen can conveniently make them. The glafs generally used is the best flint; though it is not absolutely determined which kind of metal is the best for electrical globes or cylinders. The thickness of the glafs seems immaterial, but perhaps the thinnest is preferable. It has often happened, that glafs globes and cylinders, in the act of whirling, have burst in innumerable pieces with great violence, and will some danger to the by-standers. Thofe accidents are fooposed to happen when the glafs or cylinders, after being blown, are suddenly cooled. It will therefore be necessary to enjoin the workmen to let them pafs gradually from the heat of the glafs-house to the atmospheric temperature.

It has been long questioned, whether a coating of some electrioe substance, as rosin, turpentine, &c. on the inside surface of the glafs, has any effect to increafe its electrical power; but now it seems pretty well determined, that if it does not increafe the power of a good glafs globe or cylinder, at leaft it does considerably improve a bad one.

The next thing belonging to the electrical machine necessary to be described, is the rubber which is to ex. 

gage the glafs, so as to prevent the frictition of the 

electric. The rubber, as it is now made, 

consists of a cushion of red Bafi skin fluffed with hair or flannel, and faftened to a piece of wood well rounded 
at the edges. To this is glued a flap of Perifian 

black silk, which nearly goes over one half of the cylinder. The method of using the amalgam is by spreading it on a separate piece of leather, and applying it occasionally to the under part of the cylinder while turning. Thus only a very small part of the amalgam is consumed, at the same time that the glafs is very strongly excited. The most powerful composition for the kind exciting an electrical cylinder is found to be an amalgam of mercury and zinc, in the proportion of one part of the former to five of the latter. The mercury ought to be previously triturated with some melted grease or bees-wax, by which means the amalgam will be the finer. The composition called Ahrum Mofticum, Ahrum mufjicus, or Mufic gold,* will answer very near * See Ch. as well, though somewhat less cleanly and agreeable. The rubber itself should be supported by a fpring; by which means it will easily fiue all inequalities that may be on the surface of the glafs; and by a fcrew, if the support may be made to press more or lefs as occasion requires, and infu. It should likewise be infolated in the most perfect manner; late the rubber.

As, when infusion is not required, it may be ea- 
yly taken off by a chain or wire hung upon it, and thus communicate with the earth or with any unelec-

trified body; but where there is no contrivance for infulating the rubber, it is impossible to perform many of the moft curious electric experiments. In short, to construct the rubber properly, it must be made in such a manner, that the fide it touching in whirling may be as perfect a conductor as it can be made, in order to supply electricity as quick as possible; and the opposite part should be as perfect a non-conductor as possible, in order that none of the fluid accumulated upon the glafs may return back to the rubber; which has been found to be the cafe when the rubber was not made in a proper manner.

Mr William Jones of Holborn, London, instrument- maker, has made a confiderable improvement on this part of electrioe machines by a very fimple contriv- 
ance. It consists in a fpring placed within the rub- 
ber itself; the action of which is found to be better suited for adapting the rubber to the inequalities of the glafs, than that placed entirely without the rubber. It consists of a piece of flexible iron or brafs, represented edgeways by Afig. 1.; and it is evident that it acts in plate a much more parallel and uniform manner than the cixsis.
forms of the glass is immaterial with respect to the charge it will contain; its thickness only is to be considered: for the thinner it is, the more easily will it receive the utmost charge it can bear; but it is at the same time more subject to be broken: for this reason, therefore, a thinly coated jar or plate may be used, very well by itself, and is very convenient for many experiments; but when large batteries are to be constructed, then it is necessary to use glass a little thicker, and care should be taken to have them perfectly, well annealed. If a battery is required of no very great power, as containing about eight or nine square feet of coated glass, common pint or half-pint phials may be made of use. They may be easily coated with tin-foil, sheet-lead, or gilt-paper, on the outside, and brafs-filings on the inside: they occupy a small space, and, on account of their thinness, hold a very good charge. But when a large battery is required, then these phials cannot be used, for they break very easily; and for that purpose, cylindrical glass jars of about 1½ inches high, and four or five inches in diameter, are the most convenient.

When glass plates or jars, having a sufficiently large opening, are to be coated, the best method is to coat them with tin-foil on both sides, which may be fixed upon the glass with varnish, gum-water, bees-wax, &c. But in cases the jars have not an aperture large enough to admit the tin-foil, and an instrument to adapt it to the surface of the glass, then brafs-filings, such as are fold by the pin-makers, may be advantageously used; and they may be stuck on with gum-water, bees-wax, &c. But not with varnish, for this is apt to be set on fire by the discharge. Care must be taken that the coatings do not come very near the mouth of the jar, for that will cause the jar to discharge itself. If the coating is about two inches below the top, it will in general do very well: but there are some kinds of glass, especially tinged glass, that when coated and charged, have the property of discharging themselves more easily than others, even when the coating is five or six inches below the edge. There is another sort of glass, like that of which Florence flasks are made, which, on account of some unvitriied particles in its substance, is not capable of holding the least charge. On these accounts, therefore, whenever a great number of jars are to be chosen for a large battery, it is advisable to try some of them first, so that their quality and power may be ascertained.

Electricians have often endeavoured to find some other electric, which might answer better than glass for this purpose, at least be cheaper; but, except Father Beccaria's method, which may be used very well, no remarkable discovery has been made relating to this point. He took equal quantities of very pure colophonium, and powder of marble sifted exceedingly fine, and kept them in a hot place a considerable time, where they became perfectly free from moisture: he then mixed them, and melted the composition in a proper vessel over the fire; and, when melted, poured it upon a table, upon which he had previously stuck a piece of tin-foil, reaching within two or three inches of the edge of the table. This done, he endeavoured to raise a hot iron to spread the mixture all over the table as equally as possible, and to the thickness of one-tenth of an inch: he afterwards coated it with another piece of tin-foil reaching within about two inches of the edge.
ELECTRICITY.

Apparatus. edge of the mixture: in short, he coated a plate of this mixture like a plate of glass. This coated plate, from what he says, seems to have had a greater power than a glass plate of the same dimensions, even when the weather was not very dry: and if it is not subject to break very easily by a spontaneous discharge, it may be very conveniently used; for it does not readily attract moisture, and consequently may hold a charge of electricity better, and longer, than glass: besides, if broken, it may be repaired by a hot iron; but glass, when broken, cannot so easily be repaired.

When a jar, a battery, or in general a coated electric, is to be discharged, the operator should be provided with an instrument called the discharging rod, which consists of a metallic rod sometimes straight, but more commonly bent in the form of a C; they are made also of two joints, so as to open like a kind of compasses. This rod is furnished with metal knobs at its extremities, and has a non-conducting handle, generally of glass or baked wood, fastened to its middle. When the operator is to use this instrument, he holds it by the handle, and touching one of the coated sides of the charged electric with one knob, and approaching the other knob to the other coated side, or some conducting substance communicating with it, he completes the communication between the two sides, and discharges the electric.

The instrument to measure the quantity, and ascertain the quality, of electricity, are commonly called electrometers, and they are of four sorts: 1. The single thread; 2. the cork or pith balls; 3. the quadrant; and, 4. the discharging electrometer. The second sort of electrometer, i.e. the cork-ball electrometer, was invented by Mr. Canton; the discharging electrometer was invented by Mr. Lane, and hath been improved by Mr. Henley; another on a different principle by Mr. Kinnerley; and the quadrant electrometer, which is of latest invention, is a contrivance of Mr. Henley.

Besides the apparatus above described, there are several other instruments useful for various experiments; but these will be described occasionally. The electrician, however, ought to have by him, not only a single coated jar, a single discharging rod, or, in short, only what is necessary to perform the common experiments; but he should provide himself with several plates of glass, with jars of different sizes, with a variety of different instruments of every kind, and even tools for constructing them; in order that he may readily make such new experiments as his curiosity may induce him to try, or that may be published by other ingenious persons who are pursuing their researches in this branch of philosophy.

§ 2. Description of the most useful Electrical Machines.

The first which may be mentioned is that described by Dr. Priestley in his history of electricity; which, on account of its extensive use, may be deservedly called a useful electrical machine.---The basis consists of two oblong boards a a, which are placed in a situation parallel to one another, about four inches asunder, and kept in that position by two pieces of wood adapted for the purpose. These boards, when set horizontally on a table, and the lowermost of them fixed with iron cramps, form the support of two perpendicular pillars of baked wood, and of the rubber of the machine. One of the pillars, together with the spring supporting the rubber, slides in a groove s, which reaches almost the whole length of the upper board; and, by means of a screw, many be placed at any required distance from the pillar b, which is fixed, being put through a mortise in the upper board, and fastened to the lower. In these two pillars are several holes for the admission of the spindles of different globes; and as they may be situated at any distance from one another, they may be adapted to receive not only globes, but cylinders and spheroids of different sizes. **In this machine (says Dr. Priestley), more than one globe or cylinder may be used at once, by fixing one above the other in the different holes of the pillars; and by adapting to each a proper pulley, they may be whirled all at once, to increase the electricity.** But this construction has one capital defect, that rubbers cannot be conveniently applied; so that the power of several globes put together in this manner, though greater than one, is by no means equal to what it would be if the power of them all taken singly were united. Fig. 3. shows a machine of this kind contrived by Dr. Watson.

The rubber ought to be made as before directed. It is supported by a socket which receives the cylindrical axis of a round and flat piece of glass or baked wood g, the opposite part of which is inserted into the socket of a bent iron spring k. These parts are easily separated, so that the rubber, or the piece of wood that serves to insulate it, may be changed at pleasure. The spring admits of a twofold alteration of position; being capable of either slipping along the groove, or moving in the contrary direction, the groove being wider than the screw that fastens the spring, so as to give it every desirable position with regard to the globe or cylinder; and it is besides furnished with a screw which makes it press harder or lighter as the operator chooses. The wheel of this machine is fixed to the table at e, and has several grooves for admitting more springs than one, in case that two or three globes or cylinders are used at a time; and as it is disengaged from the frame of the machine, the latter may be screwed at different distances from the former, and so would be suited to the variable length of the firing. The chain connected with the rubber at n is for making a communication with the table, when insulation is not wanted. The prime conductor is made of copper, hollow, and in the form of a pear; having its neck placed upwards, and its bottom, or rounded part k, placed on a stand of glass or baked wood. An arched wire l proceeds from its neck, having an open ring at its end, in which some small pointed wires m are hung, that by playing lightly on the globe or cylinder collect the electric fluid from it.

Next to Dr. Priestley's machine is one invented by Dr. Ingenhouz, and which for its simplicity and usefulness makes a fine contrast with the former.---This machine consists of a circular glass-plate about one foot diameter, which is turned vertically by a winch fixed to the iron axis that passes through its middle; and it is rubbed by four cushions, each about two inches long, situated at the opposite ends of the vertical diameter. The frame consists of a bottom board, about a foot square, or a foot long and six inches broad, which when the machine is to be used, may be fastened by an iron crank to the table. Upon this board two other slender and smaller ones are raised, which lie parallel
Apparatus, to one another, and are fastened together at their top by a small piece of wood. These upright boards support in their middle the axis of the plate, and to them the rubbers are fastened. The conductor is of hollow brass; and from its extremities branches are extended, which, coming very near the extremity of the glass, collect the electricity from it.

The power of this machine is perhaps more than a person would imagine by looking at it. It may be objected, that this construction will not easily admit of the rubbers being isolated, nor consequently be adapted to a great variety of experiments; but at the same time it must be allowed, that it is very portable, that it is not very liable to be out of order, and that it has a power sufficiently strong for physical purposes; on which account it may be conveniently used.

Fig. 4. represents a very portable electrical machine invented by Mr. Reid, and improved by Mr. Lane. A is the glass cylinder, moved vertically by means of the pulley at the lower end of the axis. This pulley is turned by a large wheel B which lies parallel to the table. There are three pulleys of different dimensions marked in the figure; one of which revolves four times for every revolution of the large wheel B. The conductor C is furnished with points to collect the fluid, and is screwed to the wire of a coated jar D, which stands in a socket between the cylinder and the wheel. The figure also represents the manner of applying Mr. Lane's electrometer to this machine; of which an account shall be given afterwards.

Electrical machines have undergone some very essential alterations and improvements; both from the suggestions of private electricians and the inventions of Messrs. Adams, Nairne, and Jones, instrument makers of London. We shall subjoin a description of the most approved ones.

Fig. 5. represents a most convenient machine for philosophical purposes, and whose power is equal to that of much larger ones of the old construction. The frame of this machine consists of the bottom board A B C D; which, when the machine is to be used, must be fastened to the table by two brass or iron cramps made for that purpose. Upon the bottom board there are two round pillars E F, perpendicularly raised, which will both answer the purpose if made of baked wood. These serve to support the cylinder G by the axles of the brass or wood caps H. From one of these proceeds the long axle H, passing through an hole in the pillar F; having a simple winch I fixed on its square end; or sometimes, as in fig. 6, below a pulley J. On the circumference of this pulley are several grooves in order to fit the variable length of the firing wire, which goes round one of them, as well as round the large multiplying wheel A. The other cap of the cylinder has a small cavity which fits the conical extremity of a strong wire proceeding from the pillar. The wheel A, which is moved by the handle, turns round a strong axle proceeding from about the middle of the same pillar. In small machines the simple winch may be adopted with great advantage, as is represented in fig. 5, as not being liable to disorder; but in large ones the multiplying wheel is indispensably necessary.

In all these machines the rubber is composed of a cushion stuffed with horse-hair or flannel, fastened to a board behind. It is covered with red Baize leather; and from its under edge a piece of black Persian silk is glued, which goes over the cylinder as at a, fig. 5, to near the points of the conductor fixed in the conductor. Thus a greater power of electricity is excited than what could have been done by the former machines. In them a piece of leather was fastened to the lower edge of the cushion, bearing against the cushion itself. To this piece of leather another of oiled silk was sewed, covering the cylinder as above described. In this way some of the amalgam above described was to be laid upon the piece of leather, and worked into its substance as much as possible; but in the present method nothing more is necessary than to hold an amalgamated piece of leather once or twice to the cylinder, while turning. The rubber is fixed to a glass pillar K (fig. 5.) which is fastened into a wooden basis L at the bottom. This turns on a hinge; and by means of a screw at M, going through the basis to a fixed block on the frame, the pressure of the cylinder may be augmented or diminished at pleasure; at the same time that it is rendered much more steady and uniform than by a flat sliding board and tightening screw as formerly used.

The glass pillar K, as well as all other glass pillars, the glass feet of insulating floors, &c. should be covered with varnish or rather sealing-wax; otherwise they will inflate very imperfectly on account of the moisture they attract from the air in damp weather. It was usual to support the rubber upon two springs screwed to its back, and which proceeded from the wooden cap of the pillar, in order to give way and suit the inequalities of the glass; but by this contrivance the line of contact with the cylinder was not always the same, nor its pressure uniform, as already observed. But Mr. William Jones has removed this difficulty by the bent spring represented fig. 1. It is fixed by a screw at B, and gives way by sliding notches at a a a its length and breadth are equal to that of the cylinder, and its thickness proportional to the diameter and action of the cylinder upon it. In the machine above described, the rubber is well insulated, which is a great advantage when it is necessary to connect both the cylinder and conductor, called the negative conductor; and when this happens not to be the case, which it usually is in making the common experiments, a chain with a small hook and ring may be hung to one end of the conductor, the other falling upon the table as in fig. 5.

The prime conductor belonging to this machine is represented by N in the same figure. It receives the electric fluid from the cylinder, and is usually made of brass or tin japanned. It is insulated by the glass pillars that supports it, and which is screwed to a wooden basis or foot. It is found more convenient to place the conductor parallel to the cylinder than with one of its ends towards it as was formerly done.

The handle of the wheel A, fig. 6, or the simple winch J, fig. 5, should be so turned, that the excited part of the cylinder may revolve from the rubber to the collecting points on the conductor; the prime conductor, standing then as in the figures, will be electrified positively, or overcharged with the electric fluid: for by the action of rubbing, the cylinder pumps as it were, the fluid from the rubber, and every other body properly connected with it, and gives it to the prime.

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Apparatus. prime conductor. But if negative electricity be required, the chain must be removed from the rubber, and hung to the prime conductor: for in this case, the electricity of the prime conductor will be communicated to the ground, and the rubber remaining inflated will appear strongly negative. If another conductor, equal in size to $N$, be connected with the rubber, as strong negative electricity may be obtained from the other.

Medical apparatus. Fig. 6. represents an electrical machine with a conductor in the shape of $T$, and an improved medical apparatus, where it is necessary to give the shock in the arms, will be more particularly explained afterwards, under the article Medical Electricity.

Mr. Nairn's patent machine. Fig. 7. shows Mr. Nairn's patent electrical machine for medical purposes. Its principal parts are the glass cylinder, generally about 7 inches in diameter and 72 in length, with the two conductors parallel to it. It is furnished with wooden caps, and turns in two wooden pieces cemented on the top of two strong glass pillars $BB$. These pillars are made fast into the bottom board of the machine, which is fastened to the table by means of a crank. There are grooves made in the under part of the bottom of the crank, through which the pieces $F, F$ slide. On these pieces the pillars stand by which the two conductors are supported; and in order to place these conductors nearer to the cylinder, or remove them farther from it, the pieces on which they stand are moveable outwards or inwards, and may be fixed by the two screw-nuts $LL$. The rubber is fastened to the conductor $K$; and consists of a cushion of leather stuffed, having a piece of silk glued to its under part. This latex being turned over the surface of the cushion, and thus interposed between it and the glass, goes over the cylinder, and almost touches the pointed wires which are fixed on the other conductors for the purpose of collecting the electric fluid from the cylinder. The conductors are of tin covered with black lacquer, each of them containing a large coated glass jar, and like-wise a smaller one, or a coated tube, which are visible when the caps $NN$ are removed. To each conductor is fixed a knob $O$, for the occasional suspension of a chain to produce positive or negative electricity. That part of the winch $C$ which acts as a lever in turning the cylinder, is of glass. Thus every part of the machine is insulated, the cylinder itself and its brass caps not excepted; by which means the least quantity possible of electric fluid is diffipated, and hence of course the effects are likely to be the more powerful. And to this the inventor has adapted some flexible conducting joints, a discharging electrometer, and other utensils necessary for the practice of medical electricity.

To these descriptions of electrical machines, we shall add that of a very large and powerful one in 'Teyler's Museum at Haarlem, and which was constructed by one Mr. John Cuthbertson, an English mathematical instrument-maker. It consists of two circular plates of glass, each 64 inches in diameter, and made to turn upon the same horizontal axis, at the distance of 7, 7 inches from one another. These plates are excited by eight rubbers, each 14 inches long. Both sides of the plates are covered with a thin substance to the distance of 16 inches from the centre, both to render the plates stronger, and like-wise to prevent any of the electricity from being carried off by the axis. The prime conductor consists of several pieces, and is supported by three glass pillars 57 inches in length. The plates are made of French glass, as this is found to produce the greatest quantity of the electricity next to English flint, which could not be produced of sufficient size. The conductor is divided into branches which enter between the plates, but collect the fluid by means of points only from one side of the plate. The force of two men is required to work this machine; but when it is required to be put in action for any length of time, four are necessary. At its first construction nine batteries were applied to it, each having 15 jars, every one of which contained about a foot square of coated glass; so that the grand battery formed by the combination of all these contained 135 square feet. The effects of this machine were astonishing, as shall be mentioned in its proper place: but Dr. Van Marnus, who principally made experiments with it, imagining that it was still capable of charging an additional quantity of coated glass, afterwards added to it 90 jars of the same size with the former; so that it now contains a coated surface of 225 feet, and the effects are found to be proportional.

We now come to describe some of the other parts of an electrical apparatus, and which, though not essentially necessary for exciting the property called electricity, are absolutely so for communicating it from one body to another, and performing many experiments which the machines themselves, however powerful, could not accomplish. Of these, the first we shall describe is that called the discharger; by which the electricity, whether positive or negative, collected upon one body, may be suddenly transferred from it to another, which is called discharging the electricity of the former, if only one body be perceptibly electrified; or of both, if the one contain positive and the other negative electricity.

Fig. 8. represents Mr. Henley's universal discharger; Plate an instrument of very extensive use in forming communications between jars or directing the shock through any particular substance. $AB$ is a flat board 15 inches long, 4 broad, and 1 thick, and forming the basis of the instrument. $DC$ are two glass pillars cemented in two holes upon the board $AB$, and furnished at their tops with brass caps; each of which has a turning joint, and supports a spring tube, through which the wires $EF$ and $ET$ slide. Each of these caps is composed of three pieces of brass, connected with each other in such a manner, that the wire $EF$, besides its sliding through the socket, has two other motions, viz. an horizontal one and a vertical one. Each of the wires is furnished with an opening ring at one end, and at the other a brass ball; which, by a short spring socket, is slipped upon its pointed extremity, and may be removed from it at pleasure. $HG$ is a strong circular piece of wood five inches diameter, having a slip of ivory inlaid on its surface, and furnished with a strong cylindrical foot, which fits the cavity of the socket $I$. This socket is fixed in the middle of the bottom board, and has a screw at $K$; by which the foot of the circular board is made fast at any required height.

Fig. 9. is a small press belonging to this instrument. It consists of two oblong pieces of wood, which
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which are forced together by the two screws a a. The lower end has a cylindrical foot equal to that of the circular table H. When this press is to be used, it must be fixed into the socket J, in place of the circular board HG; which in that case is to be removed.

*37 Electrical jar or Leyden phial.*

Fig. 10. shows an electrical jar or Leyden vial, for the purposes chiefly of giving a shock, or of accumulating a quantity of electricity in such a manner as could not be done in any other way, without using an immense extent of electrified surface. It is coated on the inside with tin-foil to the height of about three inches below the top of the cylindrical part of the glafs; and having a wire with a round brass knob at its extremity, which passes through the middle of a piece of wood D, is used as a fopper for the bottle. Its lower end is usually connected with the inside coating by means of a piece of chain or slender wire.

*38 Electrical battery.*

Fig. 11. shows the most approved construction of an electrical battery; a part of the apparatus which takes its name from its construction and formidable effects. It consists of a number of coated jars, placed in such a manner that they may all be charged at the same time, and discharged in an instant; so that the whole power of electricity accumulated in them may be once exerted upon the substance exposed to the shock. The battery represented in the figure consists of nine jars connected together by the wires b, c, d, e, f, g, h, i; all of which are fastened into the wood-stoppers of the bottles, and meet at top in the brass ball. Thus a communication is made between all the inside coatings of the jars, while their outside coatings are connected by the bottom of the box on which they stand; and which, that it may conduct the better, is covered with tin-foil. In one side of the box near the bottom is an hole through which a brass hook passes, and which communicates with the metallic lining of the box, and consequently with the outside coating of the jars. To this hook a wire or chain is occasionally connected when a discharge is made; and for the more convenient making of this discharge, a ball and wire B proceed to a convenient length from the centre ball A. When the whole force of the battery is not required, one, two, or three jars may be removed only by pricking down the wires belonging to them, until their extremities can fly out of their respective holes in the brass ball, and then turning them into such a posture that they cannot have any communication with the battery. The number of jars represented in this figure is rather small for some purposes; but it is better to join two or three small batteries together rather than have a single large one, which is inconvenient on account of its weight and unwieldiness.

The construction of jars and batteries is part of the business of an electrician; and he ought to be expert in coating the vials himself, not only because of the expense attending the employment of others, but because he may sometimes be at too great a distance from workmen who are accustomed to operations of this kind. A considerable difficulty arises with respect to the size of the jars and the kind of glafs they are to be made of. Fine flint or crystal glafs may probably be made use of with greater advantage than any other; but the expense here brings a very considerable object, especially as the jars of a battery are very apt to break by reason of the inequality of their strength; for it would seem that the force of the fluid in a battery is equally distributed among all the bottles, without any regard to their capacities of receiving a charge, singly considered. Thus, if we express the quantity of charge which one jar can easily receive by sometimes the number 10, we ought not to combine such a jar with another whose capacity is only 8; because the whole force of electricity expressed by 10 will be directed also against that whole capacity is only 8; so that the latter will be in danger of being broken. It will be proper, therefore, to compare the bottles with one another in this respect before putting them together in a battery. Besides the consideration of the absolute capacity which each bottle has of receiving a charge, the time which is taken up in charging it must also be attended to; and the jars of a battery ought to be as equal as possible in this respect as well as in the former. The thinner a glafs is, the more readily it receives a charge, and vice versa; but it doth not follow from thence, as electricians in general imagined till lately, that, on account of its thinness, it is capable of containing a greater charge than a thicker one. The reverse is actually the case: and though a thick glafs cannot be charged in such a short time as a thin one, it is nevertheless capable of containing a greater power of electricity. If the thickness of the glafs be very great, no charge can indeed be given it; but experiments have not yet determined how great the thicknes must be which will prevent any charge. Indeed it is observed, that though a thick glafs cannot be charged by a weak electric machine, it may be so by a more powerful one: whence it seems reasonable to suppose that there is no real limit of this kind: but that if machines could be made sufficiently powerful, glases of any thickness might be charged. Mr Brookes, an ingenious electrician of Norwich, constructed his batteries, which Brooke's apparatus appear to have been very powerful, of green-glafs bottles. Some of them, like that represented in the figures, had only nine of these bottles; but when a greater power was wanted, more were added. Jars would have been preferred to bottles on account of their being more easily coated by reason of their wide mouths; but being less easily procured, he was content to put up with this inconvenience. The mean size of these bottles was about eight inches in diameter; they were coated to inches high, and made of the thickest and strongest glasfs that could be procured, weighing from five pounds and an half to seven pounds each. In the construction of a battery of 27 bottles, he disposed of them in three rows; nine of the stoutest and best composing the first row, nine of the next in strength being disposed of in the second, and the third containing the nine weakest. All of these were of green glasfs, but not of the same kind. Some which stood in the foremost row were composed of a kind very like that of which Frontinae wine-bottles are made; and our author remarks, that this kind of glass seems to be by much the best, as being both harder and stronger, and less liable to break by an high charge. The second and third rows of the battery consisted of bottles whose diameter was from six and an half to ten inches, and which were coated from eight and an half to eleven inches high; none of their mouths being larger than an

Apparatus.  

42. Method of mending bottles when broken by a discharge.

An inch and a half, nor less than three quarters of an inch. In case any of the bottles being broken by the discharge of the battery, Mr. Brooks found that it could be mended in such a manner as to become serviceable by a cement made according to the following receipt: "Take of Spanish-white eight ounces; heat it very hot in an iron ladle, to evaporate all the moisture; and when cool, sift it through a lawn sieve: add three ounces of pitch, three quarters of an ounce of rosin, and half an ounce of bees-wax: heat them all together over a gentle fire, stirring the whole frequently for near an hour; then take it off the fire, and continue the stirring till it is cold and fit for use." The bottles cemented with this composition, however, were not judged to be sufficiently strong to stand in their original place, but were removed to the second or third row, as it was apprehended they could best sustain the charge. All the bottles of this battery, as well as the single ones he commonly made of in his experiments, were coated both on the inside and outside with slips of tin-foil from three-eighths to three-fourths of an inch wide, laid on with paste of flour and water, at the distance of about the breadth of a slip between each.

Fig. 12. represents the insulating stool, a very useful part of the apparatus, especially for medical purposes, where it is often necessary to insulate the human body. In these cases it is proper to have it of a magnitude sufficient to hold a chair or other feat, on which the patient may sit during the operation. The stool itself may be conveniently constructed of mahogany board with glass feet varnished, as already directed. When in use, the insulation will be the more perfect that a piece of dry paper be put upon it.

These are the parts of the electrical apparatus essentially necessary for exhibiting the ordinary experiments; but as many very curious phenomena are to be observed in different substances, without using any part of the apparatus above described, we shall next proceed to give an account of those bodies which naturally exhibit signs of electricity, with the various phenomena attending them.

Sect. IV. A Catalogue of the different Electric Substances, with the general Phenomena attending their Excitation.

The list of substances by which electrical phenomena may be produced, is so very extensive, that it may perhaps be doubted whether all terrestial matters, metals and charcoal only excepted, may not be included in the number. Some, however, have the property much more, or exhibit particular phenomena more obviously, than others; and according to this we may divide them into classes, as shall afterwards be more particularly noticed. The following catalogues enumerate those in which the property in general has been discovered.

Electric Substances.  

The back of a cat.  

Smooth glass  

Positive  

Positive  

Every substance with which the electricity is rubbed.

Quality of Substances with which the electricity is rubbed.

Dry oiled filk, sulphur, metals.  

Woollen-cloth, quills, wood, paper, sealing-wax, white-wax, the human hand.  

Amber, or air blown upon it.  

Diamond, the human hand.  

Metals, filk, loadstone, leather, hand, paper, baked wood.  

Other finer furs.  

Sealing-wax.  

Hare's skin, weasel's, and ferret's skin, hand, leather, woolen-cloth.  

Paper, hand, hare's, weasel's skin.  

 Metals.  

Sealing-wax.  

Hare's, weasel's, and ferret's skin, hand, leather, woolen-cloth.  

Paper, hand, hare's, weasel's skin.

Baked wood  

Positive-Silk.  

Negative-Flannel.

This table contains most of those substances that exhibit the strongest marks of electricity. The following is composed by Mr. Henley, and contains a great number of substances whose electricity is much more equivocal. They were fixed or tied on the end of a Part 1. stick of sealing-wax; and excited by friction against a woollen garment, or a piece of soft black filk, by which means they became electrified as below. The strongest in power are distinguished by the letters, and the weakest by the letter w.

Metals.

A new guiner; a smooth sixpence; a brafs ferule; tin, and tin-foil; enamelled copper, s; gilding on leather, s; lead ore; copper ore; iron ore; stream tin.

Milled lead; copper, s; a polished steel button, s; a new silver ditto; a metal button gilt, s; tutenague ditto, s; iron.

Lead from a sea-chest, in which there is a mixture of tin, w.

A gilt button, basket-pattern; the juncture at the end of a brafs ferule.

Animal Substances.

Tortoise-shell, w; ivory, s; horn, s; bone, s; lamb's tooth; hofe's hoof; deer's hoof; muscle of the leg of a deer, s; cartilage, s; spur of a young cock; bill, claw, and scale from the leg.

Sect. IV. A Catalogue of the different Electric Substances, with the general Phenomena attending their Excitation.

Electric Substances.  

The back of a cat.  

Smooth glass  

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Every substance with which the electricity is rubbed.

Quality of Substances with which the electricity is rubbed.

Dry oiled filk, sulphur, metals.  

Woollen-cloth, quills, wood, paper, sealing-wax, white-wax, the human hand.  

Amber, or air blown upon it.  

Diamond, the human hand.  

Metals, filk, loadstone, leather, hand, paper, baked wood.  

Other finer furs.  

Sealing-wax.  

Hare's skin, weasel's, and ferret's skin, hand, leather, woolen-cloth.  

Paper, hand, hare's, weasel's skin.  

 Metals.  

Sealing-wax.  

Hare's, weasel's, and ferret's skin, hand, leather, woolen-cloth.  

Paper, hand, hare's, weasel's skin.

Baked wood  

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Metals.

A new guiner; a smooth sixpence; a brafs ferule; tin, and tin-foil; enamelled copper, s; gilding on leather, s; lead ore; copper ore; iron ore; stream tin.

Milled lead; copper, s; a polished steel button, s; a new silver ditto; a metal button gilt, s; tutenague ditto, s; iron.

Lead from a sea-chest, in which there is a mixture of tin, w.

A gilt button, basket-pattern; the juncture at the end of a brafs ferule.

Animal Substances.

Tortoise-shell, w; ivory, s; bone, s; horn; lamb's tooth; hofe's hoof; deer's hoof; muscle of the leg of a deer, s; cartilage, s; spur of a young cock; bill, claw, and scale from the leg.
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Phenomena.

Wool.  Silk.

lead, w; jet, s; afoflia; mineralized
sulphur; thunder-bolt stone; cornu-
ammonis; shark's tooth; coat of petri-
faction.

Several smooth native chrysalis;
brown Iceland ditto; tale, s; Ceylon
pebble, smooth and transparent; agate,
s; cornelian; amethyst, s.

A specimen of gyfnium.

ARTIFICIAL SUBSTANCES.

Staffordshire ware glazed; China
ware, s; Wedgwood's ware glazed, s;
whale's fin prepared w; writing-paper;
parchment, s; sheep's gut.

Tobacco-pipe, s; Wedgwood's ware
unglazed; clastic gum, s; hard under-
crust of a leaf; a tallow-candle, w:
olive oil; painted paper, s; silver,
burnt into glasses, unburnt; pearl-
barley, w; Indian ink, w; blue vi-
trial, s.

Dr Lewis's glass porcelain.

Neg.  Pof.

Here it must be observed, that a great number of the
substances in Mr Henry's table, particularly metals,
would have been totally incapable of excitation had
they not been insulated; and as they were rubbed a-
gainst electrics per ʃ, it is by no means fair to con-
clude that the metal was excited. It seems much more
likely that the rubber only was excited, and commu-
nicated its electricity to the metal. It must also be
observed, that though there is a very remarkable dif-
ference between substances with regard to their non-elec-
tric or conducing power, yet there seems not to be a
perfect electric in nature; for heat will destroy the el-
cetric power of glasses, and every other substance; and,
on the contrary, cold, if not attended with moisture,
renders every electric substance more electric than be-
fore. The use of warming an electric therefore, be-
fore excitation, is only to free it from the moisture
which may adhere to it.

From the above catalogues it will readily be ap-
prehended, that the powers of the electric substances not
only vary prodigiously from one another, but likewise
according to the circumstances in which they are
placed. Thus also we find, that, according to the dif-
ferent substances made use of, we may sometimes pro-
duce one phenomenon and sometimes another, in a
manner exclusive of all the rest. Hence we have a
foundation for classing electric substances according to
the various powers they occasionally exhibit, and
which we shall do in the following manner.

1. Those which exhibit a strong and permanent at-
tractive and repulsive power; of which the most
remarkable is flk.

2. For exhibiting the electric light, attraction and
repulsion, and all the other phenomena of electricity
in a very vigorous though not durable manner, glasses
is preferable to all other bodies.

3. Those which exhibit electric appearances for a
great length of time, and which communicate to con-
ducting bodies the greatest electric power. Of these
the substances called negative electrics are the most ge-
markable;
markable; such as amber, gum-lac, rosin, sulphur, &c. on the properties of which depend the phenomena of the electrophorus, to be afterwards described.

4. Those which readily exhibit electrical phenomena by heating and cooling, of which the principal is the tourmalin.

§ 1. Of the Electrical Phænomena from Silk.

This substance was first discovered to be an electric runs and repulsions on between electrified stockings.

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by Mr. Grey, in the manner we have already related, &c., but as it was by no means remarkable for emitting sparks, which most commonly engages the attention, its electric virtues were almost entirely overlooked till the year 1759. At that time Mr. Symmer presented to the royal society some papers, containing a number of very curious experiments made with silk stockings, in substance as follows.

He had been accustomed to wear two pairs of silk stockings; a black and a white. When these were put off both together, no signs of electricity appeared; but on pulling off the black ones from the white, he heard a snapping or crackling noise, and in the dark perceived sparks, which he believed to be in the air. An electric spark must be sufficient when applied externally. Getting the black stockings new dyed, and the white ones waisted, and whitened in the fumes of sulphur, and then putting them one within the other, with the rough sides together, it required three pounds three ounces to separate them. With stockings of a more substantial make, the cohesion was still greater. When the white stocking was put within the black one, so that the outside of the white was contiguous to the inside of the black, they raised nine pounds wanting a few ounces; and when the two rough surfaces were contiguous, they raised 5 pounds one pennyweight and a half. Cutting off the ends of the thread and the tufts of silk which had been left in the inside of the stockings, was found to be very unfavourable to these experiments.

Mr. Symmer also observed, that pieces of white and black silk, when highly electrified, not only cohered with each other, but would also adhere to bodies with broad and even polished surfaces, though these bodies were not electrified. This he discovered accidentally; having, without design, thrown a stocking out of his hand, which stuck to the paper-hangings of the room. He repeated the experiment, and found it would continue hanging near an hour. Having stuck up the black and white stockings in this manner, he came with another pair highly electrified; and applying the white to the black, and the black to the white, he carried them off from the wall, each of them hanging to that which had been brought to it. The same experiments held with the painted boards of the room, and likewise with the looking-glass, to the smooth surface of which both the white and the black silk appeared to adhere more tenaciously than to either of the former.

Similar experiments, but with a greater variety of circumstances, were afterwards made by Mr. Cigna of Turin, upon white and black ribbons. He took two white silk ribbons just dried at the fire, and extended them upon a smooth plane, whether a conducting or electric substance was a matter of indifference. He then drew over them the sharp edge of an ivory ruler, and found that both ribbons had acquired electricity enough to adhere to the plane; though while they continued there, they showed no other sign of it. When taken up separately, they were both negatively electrified, and would repel each other. In their separation, electric sparks were perceived between them; but when again put on the plain, or forced together, no light was perceived without another friction. When by the operation just now mentioned they had acquired the negative electricity, if they were placed, not upon the smooth body on which they had been rubbed, but on a rough conducting substance, they would, on their separation, show contrary electrifications, which would again disappear on their being joined together. If they had been made to repel each other, and were afterwards forced together, and placed on the rough surface abovementioned, they would in a few minutes be mutually attracted; the lowermost being positively, and the uppermost negatively electrified.

If the two white ribbons received their friction upon the rough surface, they always acquired contrary electrifications. The upper one was negatively, and the lower one positively electrified, in whatever manner they were taken off. The same change was instantaneously done by any pointed conductor. If two ribbons, for instance, were made to repel, and the point
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of a needle drawn opposite to one of them along its whole length, they would immediately rush together.

The same means which produced a change of electricity in a ribbon already electrified, would communicate electricity to one which had not as yet received it; viz. laying the un electrified ribbon upon a rough surface, and putting the other upon it; or by holding it parallel to an electrified ribbon, and presenting a pointed conductor to it. He placed a ribbon that was not quite dry under another that was well dried at the fire, upon a smooth plain; and when he had given them the usual friction with his ruler, he found, that in what manner ever they were removed from the plain, the upper one was negatively and the lower one positively electrified. If both ribbons were black, all these experiments succeeded in the same manner as with the white. If, instead of the ivory ruler, he made use of any skin, or a piece of smooth glass, the event was the same; but if he made use of a ftick of sulphur, the electrics were in all cases the reverse of what they had been before the ribbons were rubbed, having always acquired the positive electricity. When he rubbed them with paper either gilt or not gilt, the results were uncertain. When the ribbons were wrapped in paper gilt or not gilt, and the friction was made upon the paper laid on the plain abovementioned, the ribbons acquired both of them the negative electricity. If the ribbons were one black and the other white, whichever of them was laid uppermost, and in whatever manner the friction was made, the black generally acquired the negative and the white the positive electricity.

He also observed, that when the texture of the upper piece of silk was loose, yielding, and reticelliform like that of a flocking, so that it could move and be rubbed against the lower one, and the rubber was of such a nature as could communicate but little electricity to glasses, the electricity which the upper piece of silk acquired did not depend upon the rubber, but upon the body on which it was laid. In this case, the black was always negative and the white positive. But when the silk was hard, rigid, and of a close texture, and the rubber of such a nature as would have imparted a great degree of electricity to glasses, the electricity of the upper piece depended on the rubber. Thus, a white silk flocking rubbed with gilt paper upon glasses became negatively, and the glasses positively, electrified. But if a piece of silk of a firmer texture was laid upon a plate of glasses, it was always electrified positively, and the glasses negatively, if it was rubbed with sulphur, and for the most part if it was rubbed with gilt paper.

If an electrified ribbon was brought near an insulated plate of lead, it was attracted, but very feebly. On bringing the finger near the lead, a spark was observed between them, the ribbon was vigorously attracted, and both together showed no signs of electricity. On the separation of the ribbon, they were again electrified, and a spark was perceived between the plate and the finger.

When a number of ribbons of the same colour were laid upon a smooth conducting substance, and the ruler was drawn over them, he found, that when they were taken up singly, each of them gave sparks at the place where it was separated from the other, as did also the last one with the conductor; and all of them were negatively electrified. If they were all taken from the place together, they cohered in one mass, which was negatively electrified on both sides. If they were laid upon the rough conductor, and then separated singly, beginning with the lowermost, sparks appeared as before, but all the ribbons were electrified positively, except the uppermost. If they received the friction upon the rough conductor, and were all taken up at once, all the intermediate ribbons acquired the electricity either of the highest or lowest, according as the separation was begun with the highest or the lowest. If two ribbons were separated from the bundle at the same time, they clung together, and in that case showed no sign of electricity, as one of them alone would have done. When they were separated, the outermost one had acquired an electricity opposite to that of the bundle, but much weaker.

A number of ribbons were placed upon a plate of metal to which electricity was communicated by means of a glass globe, and a pointed conductor held to the other side of the ribbons. The consequence was, that all of them became poifed of the electricity opposite to that of the plate, according as they were taken off; except the most remote, which always kept an electricity opposite to that of the plate.

§ 2. Of the Phenomena produced by excited or electrified Glasses.

That glass is an electric substance, was first discovered by Mr Gilbert. It was for a long time, however, thought to possess a very weak electric virtue; though now it is found to be one of the best, if not the very best, electric as yet known. Notwithstanding the many experiments made upon this substance, it is not yet ascertained what kind of glass is most proper for electrical purposes. It has been observed, that the hardest and most completely vitrified glasses is often a very bad electric, being sometimes quite a conductor. Glasses vessels made for electrical purposes are often rendered fit for them by use and time, though very bad electrics when new. Mr Bergman of Upsal says, that very often, when his glasses globes could not be excited to a sufficient degree of strength, he lined them with a thin coating of sulphur, and then they gave a much stronger positive electricity than before. In Italy, and other places, according to Mr Nollet, it is the custom of electricians to put a coating of pitch or other refrinuous matter on the inside of their glasses, which they say always makes them work well. He gives the preference to the crystal glasses of England, Bohemia, &c. It seems doubtful, however, whether the common bottle of glasses does not answer equally well, or even better.

The most remarkable phenomenon producible by excited glasses is that of the Leyden vial. It depends entirely upon the following property of glasses, viz. that it is impossible to electrify the outside of a glass positively, at least to any considerable degree, without at the same time electrifying the inside negatively; in like manner, it is impossible to electrify the outside negatively; without at the same time electrifying the inside positively. It is also the nature of glasses and all electric substances, when once electrified either by excitation or communication,
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munication, to part with their electricity very slowly and gradually. Thus, supposing a tube, cylinder, or plate of glass, to be highly electrified; if a finger is brought near any part of it, a spark will be felt to strike the finger with a snapping noise. Part of the electricity will then be discharged from the glass, but not all. If the finger is brought near another part of the glass, a similar spark will be again produced; and so on, by moving the finger to different parts of the glass, till all its electricity is exhausted. It is the nature of conducting substances to discharge all their electricity at once, by a single spark, if another conducting substance is brought near them. This being the case, therefore, it follows, that if every part of one side of a glass plate is covered over with a conducting substance, every point of the glass will give out its electricity to the conductor; and consequently, if another conducting substance is brought near to that by which the glass is covered, the whole electric power in the glass ought to be discharged in one single flash or large spark.

This would no doubt be the case, if it was possible to electrify the glass only on one side. But this is found to be impossible. No method hath yet been found of electrifying one side of a piece of glass positively, without electrifying the other negatively at the same time. There is therefore a necessity for taking off the electricity from both sides of the glass at the same time. This can only be done by covering both sides of the glass with a conducting substance, and presenting other conductors to both sides at the same time; then the electricity of both is discharged in an instant. A strong spark is perceived between both sides of the coated glass and the conducting substances; and if a person holds one in each hand, he will, at the instant of the discharge, feel a very disagreeable sensation, which cannot well be described, in his arms and breast; and this is said to be receiving the electric shock.

If, instead of presenting a conducting substance to both sides of the plate at once, a finger is presented to one side, suppose that which is positively electrified, and another substance very highly electrified positively is presented to the negative side of the glass, a like discharge will ensue, but the shock will be much gentler than in the former case; and probably the electricity of the glass will not be all discharged. If two conducting substances, insulated, suppose two cylinders of metal fixed upon sticks of sealing wax, or suspended by silk threads, are brought to the sides of the coated glasses at the same time; each of them will receive a spark of positive or negative electricity, according as the side to which it was applied is positively or negatively electrified. When the metallic cylinders are taken away, they will communicate the electricity they have received to other bodies; and if again applied to the coated glass, they will receive sparks as before; and thus the electricity of both sides will be gradually discharged.

After the discharge has been once made, the glass is found in a short time to recover its electricity, tho' in a small degree. The side which was originally electrified positively, becomes electrified in the same manner the second time, and so of the negative side. This second electrification is called the residuum of a charge; and when a large surface of coated glass, hath a very considerable degree of power. The same thing, which we have just now observed with regard to a flat surface of glass, takes place with tubes and vials, or glass vessels of any kind; and it is always observed, that the thinnest glass answers best for this purpose. The Leyden vial consists of a glass vial, jar, or bottle, covered on the outside and inside with tin-foil, yet leaving an interval of two or three inches at top without any metallic covering, that the electricity of the one side may be communicated to the other as fast as it is collected. A more particular description of it will be given when we speak of the electric apparatus. The above will be sufficient to render the following experiments intelligible.

Mr Symmer, when making the experiments we have already related, concerning the strong cohesive power of electrical liquors, was induced to try the cohesive power of electrified glasses. For this purpose, he got two panes of common window-glass, the thinnest and smoothest he could meet with. He coated one of the sides with tin-foil, leaving a space uncovered near the edges. The uncovered sides were then put together, and electricity communicated to one of the coatings by means of a machine. In consequence of this, the other side, which was also coated, became electrified with an electricity opposite to the first, and both panes were charged with the same electric power, as if they had been but one. After they had received a considerable degree of electric power, they cohered pretty strongly together, but he had no apparatus by which the strength of their cohesion could be measured. He then turned the plates upside down; and discharging from his machine positive electricity upon the negative side of the glass, both panes were immediately discharged, and their cohesion ceased. Placing two panes of glass, each of them coated on both sides, one upon the other, each of them had a positive and negative side, by communicating electricity to one of them, and they did not cohere.

In consequence of these experiments made by Mr Experiments on glass plates by Mr Symmer, and another (which we shall presently give an account of) made at Pekin, Mr Beccaria made the following ones. Having charged a coated plate of glass, he took off the coating from the negative side, and applied another uncoated and uncharged (or un-electrified) plate of glass close to it. After this, putting a coating upon the uncharged glass (so that the whole resembled one coated plate consisting of two laminae), he made a communication between the two coatings. The consequence of this was an explosion, a discharge of the positive and negative electricity, and a cohesion of the plates. If the plates were separated before the explosion, after they had been in conjunction for some time, the charged plate was positive on both sides, and the uncharged one negative on both sides. If after the explosion he separated and joined them alternately, a small circle of paper, placed under the uncharged plate, adhered to it upon every separation, and was thrown off again upon every conjunction. This could be repeated even 500 times with once charging the plate. This is the experiment made at Pekin as above mentioned.

If, in these experiments, the charged plate was inverted, and the positive side applied to the uncharged plate, all the effects were exactly the reverse of the former. If it was inverted ever so often, after remaining
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By Mr. Henley. 

Mr. Henley repeated these experiments with success when he made use of plates of looking-glasses, or window and crown glasses; but when two plates of Nuremberg glasses, commonly called Dutch plates, were used, the result was very different. Each of the plates, when separated after charging, had a positive and a negative surface. When they were replaced, and a discharge made, by forming a communication between the two coatings, the electricity of all the surfaces was changed. It appeared, however, still to be very strong, and the plates continued to give repeated flashes of light when they were alternately closed, touched, and separated, like the other plates above-mentioned. If a clean, dry, uncoated plate of looking-glass was placed between the coated plates, either of looking-glass or crown-glass, before they were charged, that uncoated plate was always found, upon separating them after charging, to be electrified negatively on both sides; but if it was put between the Dutch plates, it acquired, like them, a positive and negative electricity.

The following observation of Mr. A. Epinon is very remarkable. He prefixed close together two pieces of looking-glasses, each containing some square inches; and found, that when they were separated, and not suffered to communicate with any conductor, they acquired a strong electricity, the one positive and the other negative. When put together again, the electricity of both disappeared; but not if either of them had been deprived of their electricity when they were at a distance; for in that case, the two, when united, had the electricity of the other.

These are the most remarkable experiments that have been made with electrified flat plates of glasses. Tubes of the same matter, however, afford a variety of curious phenomena of a different nature. One very remarkable one is the conducting power of new flint-glasses, which is most easily perceived in tubes, and on which Dr. Priestley makes the following observations.

He several times got tubes made two or three yards long, terminating in solid rods. These he took almost warm from the furnace, in the finest weather possible; and having immediately insulated them, perceived that the electricity of a charged vessel would presently diffuse itself from one end to the other; and this he thought would have been the case at any distance at which the experiment could have been made. When the fame tubes were a few months older, the electricity could not be diffused along their surface farther than half a yard.

The diffusive power of glasses he thought proper to try in a different manner. A tube was procured of about three feet long, but of very unequal width. About three inches of the middle part of it were coated on both sides. This coated part was afterwards charged, by communicating electricity to the inside of it by means of a wire. The consequence of this was, that not only the part through which the wire was introduced became strongly electrical on the outside, but at the opposite end, where there was neither coating nor wire, the fire crackled under the fingers as the tube was drawn through the hand, and a flame seemed continually to issue out at both ends, while it was at rest and charged.—One end of this tube was broken and rough, the other was smooth.

Another tube was procured about three feet and an half in length, and very thin. It was about an inch in diameter, and closed at one end. Three inches of it were coated on both sides, about nine inches below the mouth. This part being charged, the whole tube, to the very extremity of it, was strongly electrical, crackling very loud when the hand was drawn along it, and emitting sparks at about an inch distance all the way. After drawing the whole tube through the hand, all the electricity on the outside was discharged; but, on putting a finger into the mouth, a light streamed from the coating, both towards the figure and towards the opposite end of the tube. After this, all the outside of the tube was become strongly electrical as before; and this electricity might be taken off and recovered many times without charging the tube anew, only it was weaker each time.—Holding this tube by the coated part, and communicating electricity to the uncoated outside, both sides became charged; and, upon introducing a wire, a considerable explosion was made. The discharge made the outside strongly electrical, and by taking off this electricity, the tube became sensibly charged. The residuum of these charges was very considerable; and, in one tube, there was a residuum after 20 or 30 discharges.

By being kept for six or seven months, most of the tubes employed in these experiments lost the above-mentioned properties, and the electricity could no longer diffuse itself upon their surfaces. At length they were all broken except one, which had been the most remarkable of the whole. With this old tube, the Doctor tried to repeat the above-mentioned experiments.
The charge from a small coated part diffused itself all over the tube; so that, at the distance of a yard from the coating, it gave sparks to the finger of an inch long. On this occasion he observed, that when his finger was brought to the tube about two inches above the coating, a great quantity of the diffusing electricity was discharged; and his whole arm was violently shocked. The old tube, after being heated as above mentioned, showed a prodigious diffusive power. Upon charging a small coated part, the electricity was diffused to the end of the tube; and it gave sparks at the distance of an inch over every part of it. When it was drawn through the hand, in order to take off the diffused electricity, it instantly returned again, and the extremity of the tube would be highly electrified, even while its communication with the coating was cut off by the hand. The middle part of the tube also, which had been oftentimes heated, had a much greater diffusive power than any other. It was no sooner taken off, than it appeared again; so that it gave a continual stream of fire. The quantity of residuum after a discharge of this kind was prodigious; so that the outside coating would immediately after give almost a constant stream of fire for some time to any conducting substance placed near it.

Mr. Cavallo also observed, that in all the tubes which had the diffusion, there was a considerable noise at the orifice when his hand was drawn from the extremity towards the coating, as if the tube had been gradually discharging itself. In the dark, the electric matter seemed perpetually to pour from the open end, or both ends if they were open; and whenever his hand was drawn over it, the fire streamed from the coating to his hand in a very beautiful manner. The first time he charged any of these tubes after they had flowed a while, the diffusion was the most remarkable. It was leavened by every successive charge, and at last became exceedingly small; but after the tube had flowed a few hours uncharged, it was as vigorous as ever.

Mr. Cavallo also made some curious discoveries concerning glass-tubes. He took the hint from observing accidentally, that by agitating quicksilver in a glass tube hermetically sealed, and in whose cavity the air was very much rarified, the outside of the tube was sensibly electrified. The electricity, however, was not constant, nor in proportion to the agitation of the quicksilver. In order to ascertain the properties of these tubes, he constructed several of them, one of which is represented fig. 71. Its length was 32 inches, and its diameter something less than half an inch. The quicksilver contained in it was about three fourths of an ounce; and in order to exhaust it of air, one end of it was closed, while the quicksilver boiled in the other. Before this tube is used, it must be made a little warm and cleaned; then, holding it nearly horizontal, the quicksilver in it is suffered to run from one end to the other, by gently and alternately elevating and depressing its extremities. This operation immediately renders the outside electrical; but with the following remarkable property, viz. that the end of the tube where the quicksilver actually stands is always positive, and all the remaining part of it negative. If elevating this positive end of the tube a little, the quicksilver runs to the opposite end which was negative, then the former instantly becomes negative, and the latter positive. The positive end has always a stronger electricity than the negative. If when one end of the tube, for instance $A$, is positive, i.e. when the quicksilver is in it, that electricity is not taken off by touching it; then, on elevating this end $A$, so that the quicksilver may run to the opposite end $B$, it appears negatively electrified in a very small degree. If by depressing it again it is a second time rendered positive, and that positive electricity is not taken off, then, on elevating the end $B$ again, it appears positive in a small degree. But if, whilst it is positive, its electricity is taken off, then on being elevated, it appears strongly negative. When about two inches of each extremity of this tube is coated with tin-foil, as represented in the figure, that coating renders the electricity at the extremities more perceptible; so that sometimes they will give rise to a conductor brought near them. Tubes whose glass is about one-twentieth of an inch thick answer better for these experiments than any others.

We shall close this account of the phenomena of electricity with some experiments which show the durability of the electricity in that substance in certain circumstances. Mr. Canton procured some thin glass balls of about an inch and a half in diameter, with stems or tubes of eight or nine inches in length. He electrified them, some positively, and others negatively, on the inside, and then sealed them hermetically. Soon after, he found that they had lost all signs of electricity; but holding them to the fire at the distance of five or six inches, they became strongly electrical in a short time, and more so as they cooled. Heating them frequently he found would diminish their power; but keeping one of them under water a week did not appear in the least to impair it. That which he kept under water was charged on the 22d of September 1760, was heated several times before it was kept in water, and had been frequently heated afterwards; yet it still retained its virtue to a considerable degree till the 31st of October following. The breaking of two of his balls gave him an opportunity of observing their thickness, which he found to be between seven and eight parts of a thousand of an inch. He balls retained their virtue for six years, but in a less degree. Mr. Lullin also found, that a glass tube charged and hermetically sealed, would show signs of electricity when heated.

The most remarkable instances of the continuance of this power in glass, however, are those given by Mr. Henley in the 67th volume of the Phil. Trans. One is, of a small bottle, which showed signs of electricity for 70 days after it had been charged, and stood in a cupboard all that time. The other is of a glass cylinder, which after excitation continued to show very strong signs of electricity from the 5th day of February to the 10th of March, though various methods had been used during that time to destroy the electric virtue. These means always proved effectual when they were applied, and the cylinder for some time
§ 3. The Phenomena of excited Sulphur, Gum-lac, Amber, Rosin, baked Wood, &c.

The most remarkable property of these, as already mentioned, is the durability of their electric virtue when once excited. They are also capable of being excited by heat without any friction. This last property was discovered by Mr Wilcke, who distinguishes it by the name of spontaneous electricity. He melted sulphur in an earthen vessel, which he placed upon conductors; then, letting them cool, he took out the sulphur, and found it strongly electrical; but it was not so when it flowed to cool upon electrical substances. He then melted sulphur in glases vesseles, whereby they both acquired a strong electricity wherever placed upon electrics or not; but a stronger in the former case than in the latter; they acquired a stronger virtue still, if the glass vessel was coated with metal. In these cases, the glases was always positive and the sulphur negative. It was particularly remarkable, that the sulphur acquired no electricity till it began to cool and contract, and was the strongest in the greatest state of contraction; whereas the electricity of the glases was, at the same time, the weakest; and was the strongest of all when the sulphur was shaken out before it began to contract, and acquired any negative electricity.

Pursuing experiments of this kind, he found, that melted sealing-wax poured into glases acquired a negative electricity, but poured into sulphur a positive one, leaving the sulphur negative. Sealing-wax also, poured into wood, was negative, and the wood positive; but sulphur poured into sulphur, or into rough glases, acquired no electricity at all.

Similar experiments were also made by Mr Æpinus. He poured melted sulphur into metal cups; and observed, that, when the sulphur was cold, the cup and sulphur together showed no signs of electricity, but very strong signs of it the moment they were separated. The electricity always disappeared when the sulphur was replaced in the cup, and revived upon its being taken out. The cup had acquired a negative, and the sulphur a positive electricity; but if the electricity of either of them had been taken off while they were separate, they would both, when united show signs of that electricity which had not been taken off.

Mr Wilcke also made several curious experiments concerning the effects of different rubbers upon electric substances, the most remarkable of which is the following: viz. that sulphur rubbed against metals was always positive; and this was the only case in which it was so. But, being rubbed against lead, it became negative; and the metal positive.

With regard to the perpetual attractive power of sulphur, &c., which Mr Grey fancied he had discovered, the most remarkable example he gives is of a large cone of stone sulphur, covered with a drinking glasses in which it was made. This he laid would never fail to show an attractive power when the glasses was taken off. In fair weather, the glasses would attract also; but not so strongly as the sulphur, which never failed to attract, let the wind or weather be ever so variable. This experiment has been repeated by Mr Henley; who says he has never known the sulphur to fail of showing signs of electricity on the removal of the glases. Gum-lac, rosin, &c. agree in the same general properties with sulphur, but do not become so strongly electrified spontaneously, nor are they so easily excited.

§ 4. Phenomena of the Tourmalin.

These have been accurately observed by Dr Priestley, who gives the following account of the methods he made use of for that purpose.

1. To ascertain the kind of electricity produced, he had always at hand a stand of baked wood with four leaf me arms projecting from it. Three of these were of glases, and of observing threads of fine flake as it comes from the worm softened to them, and at the end of each thread a small piece of down. From the other arm hung a fine thread about or inches long, while a brass arm suspended a pair of pith-balls. At the other extremity of this arm, which was pointed, a jar could be placed, to receive the electricity, and by the repulsive power of it keep the balls equally diverging with positive or negative electricity; or sometimes he suspended the balls in an uninfulated state within the influence of large charged jars: and lastly, he had always a fine thread of trial at hand, by which he could discover whether the stone was electrical or not before he began his experiments.

2. Before he began any experiments on the stone, also, he never failed to try how long the fine threads, which he used as electrometers, should retain their virtue; and found this to be various in various stones. When the threads would retain their electric virtue for a few minutes, he preferred them; but when this was not the case, he had recourse to the feathers, which never failed to retain it for several hours. They might be touched without any sensible loss of power, though they received their virtue very slowly. In the experiments now to be related, he made use of Dr Heberden's large tourmalin, whose convex side became positive, and the flat side negative in cooling; and in all of them, when the positive or negative side of the tourmalin is mentioned, it is to be understood that which is positive or negative in cooling.

3. From Mr Wilcke's experiments on the production of spontaneous electricity, by melting one substance within another, he first conjectured that the tourmalin might collect its electricity from the neighboring air: To determine which the following experiment was made. Part of a pane of glases was laid on the standard bar of an excellent pyrometer, and upon that glases the tourmalin was placed. This bar was heated.
heated by a spirit lamp, so that the increase or decrease of heat in the tourmalin could thus be exactly determined. In this situation he observed, that whenever he examined the tourmalin, the glass had acquired an electricity contrary to that side of the stone which lay upon it, and equally strong with it. If, for example, the flat side of the stone had been preferred to a feather electrified positively, as the heat was increasing, it would repel it at the distance of about two inches, and the glass would attract it at the same or a greater distance; and when the heat was decreasing, the stone would attract, and the glass repel it at the distance of four or five inches. The case was the same whichever of the sides was preferred, as well as when a hill was fastened with sealing-wax upon the glass; the electricity both of the shining and glass being always opposite to that of the stone. When it came to the turn, the electricity was very quickly reversed; so that in less than a minute the electricity would be contrary to what it was before. In some cases, however, viz. where the convex surface of the tourmalin was laid upon the glass or shining, both of these became positive as well as the stone. This he supposed to be owing to the stone touching the surface on which it lay only in a few points, and that its electricity was collected from the air; which supposition was verified: for, getting a mould of Paris plaster made for the tourmalin, and heating it in the mould, fastened to a flat of glasses, he always found the mould and glass polarized of an electricity contrary to that of the stone, and equally strong with it. During the time of cooling, the mould seemed to be sometimes more strongly negative than the stone was positive; for once, when the stone repelled the thread at the distance of three inches, the mould attracted it at the distance of near half an inch. On substituting another tourmalin instead of the piece of glass, it was observed, that when one of the tourmalins was heated, both of them were electrified as much as the tourmalin and glass had been. If the negative side of a hot tourmalin was laid upon the convex side of a cold one, the latter became positive, as would have been the case with a piece of glass. On heating both the tourmalins, though fastened together by cement, they acquired the same power that they would have done in the open air.

5. As the tourmalins could not in this case touch in a sufficient number of points, it was now thought proper to vary the experiment by cooling the tourmalin in contact with sealing-wax, which would fit it with the utmost exactness. On running the stone, when cold, out of its waxen cell, it was found positive, and the wax negative; the electricity of the stone being thus contrary to what would have happened in the open air. The other side, which was not in contact with the wax, acquired the same electricity that it would have done though the stone had been heated in the open air; so that both sides now became positive. In like manner the positive side of the stone, on being cooled in wax, became negative.

6. On attempting to ascertain the state of the different sides of the tourmalin during the time it was heating in wax, many difficulties occurred. It was found impossible in these cases to know actually when the stone begins to cool; besides, that in this method of treatment it must necessarily be some time in the open air before it can be preferred to the electrometer; and the electricity of the sides in heating is by no means so remarkable as in cooling. In the experiments made with the tourmalin, when its positive side was buried in wax, it was generally found negative, though once or twice it seemed to be positive. On cooling it in quicksilver contained in a china cup, it always came out positive, and left the quicksilver negative; but this effect could not be concluded to be the consequence of applying the one to the other, because it is almost impossible to touch quicksilver without some degree of friction, which never fails to make both sides strongly positive, though it be quite cold, and especially if the stone be dipped deep into it. At last, supposing that the stone would not be apt to receive any friction by simple pressure against the palm of the hand, he was induced to make the experiment, and found it fully to answer his expectations; for thus, each side of the stone was affected in a manner directly contrary to what would have happened in the open air.

7. Softening the convex side of the large tourmalin to the end of a slice of sealing-wax, and pressing it against the palm of the hand, it acquired a strong negative electricity, contrary to what would have happened in the open air. Thus it continued till it had acquired all the power it could receive by means of the heat of the hand; after which it began to decrease, though it continued sensibly negative to the very last. On allowing the stone to cool in the open air, its negative power constantly increased till it became quite cold.

8. On heating the same flat side by means of a hot poker held near it, and then just touching it with the hand of the person who held the poker, so that it could not be borne for any length of time, it became positive. Letting it cool in the air it became negative, and on touching it again with the hand it became positive; and thus it might be made alternately positive and negative for a considerable time. At last, when it became so cool that the hand could bear it, it acquired a strong positive electricity, which continued till it came to the same degree of heat.

9. The wax was removed from the convex, and fastened to the flat side of the stone; in which circumstances it became weakly positive after receiving all the heat the hand could give it. On letting it cool in the open air it grew more strongly positive, and continued so till it was quite cold; and thus the same side became positive both with heating and cooling.

10. On heating the convex side by means of a poker, and pressing it against the palm of the hand as soon as it could be borne, it became pretty strongly negative; though it is extremely difficult to procure any appearance (A) This would probably have been found always the case; for here the stone and mould acted in a manner similar to the electrphorus and its metal plate; the latter of which always discovers a greater electric power than the former.
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11. On covering the tourmalin when hot with oil and tallow, no new appearances were produced; nor did the heating of it in boiling oil produce any other effect than lessening the electricity a little; and the event was the same when the tourmalin was covered with cement made of bees-wax and turpentine. On making a small tourmalin very hot, and dropping melted sealing-wax upon it, so as to cover it all over to the thickness of a crown piece, it was found to act through this coating nearly, if not quite, as well as if it had been exposed to the open air. Thus a pretty fiction may be made; for if a tourmalin be inclosed in a flick of wax, the latter will seem to have acquired the properties of the stone.

12. On letting the stone cool in the vacuum of an air-pump, its virtues seemed to be diminished about one half, owing no doubt to the vacuum not being sufficiently perfect.

13. On fixing a thin piece of glass opposite and parallel to the flat side of the tourmalin, and about a quarter of an inch distance from it, in an exhausted receiver, the glass was so lightly electrified, that it could not be distinguished whether it was positive or negative.

14. On laying the stone upon the standard bar of the pyrometer, and communicating the heat to it by means of a spirit lamp, it was extremely difficult to determine the nature of the electricity while the heat was increasing to 70°; during which time the index of the pyrometer moved about one two-hundredth part of an inch. But if the stone was taken off the bar, and an electrified thread or feather prefented to that side which had lain next it, the convex side was always negative, and the flat side positive.

15. To determine what would be the effect of keeping the tourmalin in the very same degree of heat for a considerable time together, it was laid upon the middle of the bar, to which heat was communicated by two spirit lamps, one at each extremity; and making the index move 45 degrees, it was kept in the same degree for half an hour without the least sensible variation; and it was observed, that the upper side, which happened to be the convex one, was always electrified in a small degree, attracting a fine thread at the distance of about a quarter of an inch. If in that time it was taken off the bar, though ever so quick, and an electrified feather presented to it, the flat side, which lay upon the bar, was negative, and the upper side very slightly positive, which appeared only by its not attracting the feather.

On putting a piece of glass between the stone and standard bar, keeping it likewise in the same degree of heat, and for the same space of time as before, the result was the same; the glass was slightly electrified, and of a kind opposite to that of the stone itself. To avoid the inconvenience of making one side of the stone hotter than another, which necessarily took place when it was heated on the pyrometer, the following method was used. By means of two rough places which happened to be in the stone, it was tied with a silk thread which touched only the extreme edge of it; and thus being perfectly insulated, it might be held at any distance from a candle, and heated to what degree was thought necessary; while, by twisting the string, it was made to prefer its sides alternately, and thus the heat was rendered very equal in both. After being made in this manner so hot that the hand could scarce bear it, it was kept in that situation for a quarter of an hour. Then, with a bundle of fine thread held for some time before in the same heat, the electricity which it had acquired by heating was taken off, and it was found to acquire very little if any; whence appeared the justness of an observation of Mr. Catenian's, that it is the change of heat, and not the degree of it, that produces the electric property of this stone.

16. On heating the stone suddenly, it may sometimes be handled and pressed with the fingers several times before any change takes place in the electricity which it acquires by heating, though it begins to cool the moment it is removed from the fire. In this case, however, the stone must be heated only to a small degree. When the heat is three or four times as great as is sufficient to change the electricity of the two sides, the virtue of the stone is the strongest, and appears to be so when it is tried in the very neighborhood of the fire.

In the very centre of the fire the stone never fails to cover itself with ashes attracted to it from every quarter; whence it acquired its name in Dutch.

17. The tourmalin often changes its electricity very slowly; and that which it acquires in cooling never fails to remain many hours upon it with very little diminution. It is even possible, that in some cases the electricity acquired by heating may be so strong as to overpower that which is acquired by cooling; so that both sides may show the same power in the whole operation.

I am very certain (says the Doctor), that in my hands both the sides of Dr. Heberden's large tourmalin have frequently been positive for several hours together, without any appearance of either of them having been negative at all. At this time I generally heated the tourmalin, by presenting each side alternately to a red hot poker, or a piece of hot glass, held at the distance of about half an inch, and sometimes I held it in the focus of a burning mirror; but I have since found the same appearance when I heated it in the middle of an iron hoop made red hot. The stone in all these cases was fastened by its edge to a flick of sealing-wax. This appearance I have observed to happen the oftener when the iron hoop has been exceedingly hot, so that the outside of the stone must have been heated some time before the inside; and I also think there is the greatest chance of producing this appearance, when the convex side of the stone is made the hotter of the two. When I heat the large tourmalin in this manner I seldom fail to make both sides of the stone positive till it be about blood-warm. I then generally observe a ragged part of the flat side towards one end of the stone become negative first, and by degrees the rest of the flat side; but very often one part of the flat side will, in this method of treatment, be strongly positive half an hour after the other part is become negative."

Sect. V. Of the different Theories of Electricity, with the principal Experiments brought in favour of each, and which tend more particularly to show the Nature of the Electric Fluid.

It is not to be supposed, that the phenomena of elec-
Electricity would long be observed without attempts to account for them. In fact, this was attempted by Thales, who first observed the attractive power of amber. At this property he was so much surprised, that he reckoned the amber to be animad. With regard to the sentiments of Theophrastus on this subject, we are entirely in the dark; but, among the succeeding electricians, all the phenomena were derived from undinous effluvia emitted by the excited electricity. These were supposed to fasten upon all bodies in their way, and to carry back with them all that were not too heavy. For, at that time, effluvia of every kind were supposed to return to the bodies from which they were emitted; since nobody could otherwise account for the substance not being feifibly wafted by the constant emission. When those lighter bodies on which the undinous effluvia had fastened were arrived at the excited electricity, a fresh effusion of the effluvia was supposéd to carry them back again. But this effect of the effluvia was not thought of till electric repulsion, as well as attraction, had been fully observed.

The discovery of a difference between conducting and non-conducting substances, threw considerable difficulties in the way of those who maintained the hypothesis of undinous effluvia. When the Newtonian philosophy began to be pretty generally received, the terms attraction and repulsion were quickly introduced into electricity, as well as other branches of philosophy; and the electric effluvia, instead of being of an undinous nature, were said to be of an attractive or repulsive one. At the same time, the apparent stop which is put to the progress of these effluvia by any electric substance, introduced a question not yet well decided, viz. Whether electric bodies are penetrable by the fluid or not?

When Mr. Du Fay discovered the two opposite species of electricity, at that time distinguished by the names of vitreous and resinous, and afterwards by those of plus and minus, or positive and negative, he formed the idea of two distinct electric fluids. Both these were supposed to have a repulsive power with respect to themselves, but an attractive one with regard to one another.

As long as electrical attraction and repulsion were the only phenomena to be accounted for, this theory served the purpose well enough. To account for attraction and repulsion by an attractive and repulsive power, was indeed no explication at all; but it afforded a change of terms, which is too frequently mistaken for an explanation both in electricity and other parts of philosophy. At last, however, Mr. Du Fay dropped his opinion concerning the existence of two electric fluids, and thought that all the phenomena might be accounted for from the action of a single one. The vitreous or positive electricity, which was supposed to be the stronger, he thought might attract the negative, or weaker electricity. It is indeed true, that, in many experiments, the positive electricity doth manifest a superiority in strength over the negative, something like that superior degree of vigour which is observed in one of the poles of a loadstone over the other. According to Mr. Du Fay's own principles, however, this had been the case, a body positively electrified ought to have attracted one electrified negatively more weakly than one not electrified at all; which is contrary to experience.

During all this time, it was imagined, that the electric matter, whether it consisted of one or more fluids, was produced from the electric body by friction; but by a discovery of Dr. Waton's, it became universally believed, that the glass globes and tubes served only to set the fluid in motion, but by no means to produce it. He was led to this discovery by observing, that, upon rubbing the glass tube, he was stinging upon cakes of wax or rosin (in order, as he expected, to prevent any discharge of the electric matter upon the floor), the power was, contrary to his expectation, so much lessened, that no snapping could be observed upon another person's touching any part of his body; but that, if a person not electrified held his hand near the tube while it was rubbed, the snapping was very sensible. The event was the same when the globe was whirled in similar circumstances. For, if the man who turned the wheel, and who, together with the machine, was suspended upon silk, touched the floor with one foot, the electric fire appeared upon the conductor; but if he kept himself free from any communication with the floor, little or no fire was produced. He observed, that only a spark or two would appear between his hand and the insulated machine, unless he at the same time formed a communication between the conductor and the floor; but that then there was a constant and copious flux of the electric matter observed between them. From these, and some other experiments of a similar kind, the Doctor discovered what he called the complete circulation of the electric matter. When he found, that, by cutting off the communication of the glass globe with the floor, all electric operations were stopped, he concluded, that the electric fluid was conveyed from the floor to the rubber, and from thence to the globe. For the same reason, seeing the rubber, or the man who had a communication with it, gave no sparks but when the conductor was connected with the floor, he as naturally concluded, that the globe was supplied from the rubber, as he had before concluded that it was supplied from the floor. From all this he was led to Dr. Waton's new theory of electricity, namely, that, in son's first electric operations, there was both an efflux of electric matter to the globe and the conductor, and likewise an efflux of the same electric matter from them. Finding that a piece of leaf-silver was suspended between a plate electrified by the conductor, and another communicating with the floor, hereasoned from it in the following manner. 'No body can be suspended in equil. brium but by the joint action of two different directions of power: so here the blast of electric ether from the floor setting through it, drives the silver towards the plate electrified. We find from hence, likewise, that the draught of electric ether from the floor is always in proportion to the quantity thrown by the globe over the gun-barrel (the prime conductor at that time made use of), or the equilibrium by which the silver is suspended could not be maintained.' Some time after, however, the Doctor retracted this opinion concerning the afflux and efflux, and supposed that all the electric phenomena might be accounted for from the excess or diminution of the quantity of electric matter.
ELECTRICITY.

No less difficult was it for philosophers to determine the nature of the electric fluid, than its manner of action. It had been, however, generally believed, that fire was not a difficult element, but some violent repulsions, refractions, &c., among the particles of ignited bodies. The great resemblance of the nature of the electric fluid to elementary fire, however, seemed strongly to militate against this opinion. The hypothesis therefore of fire as a difficult principle or element began to revive. Some maintained, that the electric fluid was really this principle; others thought that it was a fluid sui generis, very much resembling that of fire; while others, with Mr Boulanger at their head, imagined that it was nothing more than the finer parts of the atmosphere, which crowded upon the surfaces of electric bodies, when the grofer parts had been driven away by the friction of the rubber.

This last opinion, however, soon received a full refutation from the experiments of Dr Watson above-mentioned; by which it was proved, that the electric matter came not from the atmosphere, but from the earth. About the same time the Leyden phial was discovered; and the extraordinary effects of it rendered the inquiries into the nature of the electric fluid much more general than before. But still, the violent prejudice against the existence of fire as a real element or fluid distinct from terrestrial bodies, continued in its full vigour, and the most extravagant theories were accepted in, rather than the simple position above-mentioned. It would be tedious, and indeed impossible, to give an account of all the theories which were now invented. One of the most remarkable, and most consistent, was that of Mr Wilson. According to this Mr Wilson, the chief agent in all the operations of e-son's electricity, is Sir Isaac Newton's ether; which is more or less dense in all bodies in proportion to the smallness of their pores, except that it is much denser in phosphorous and unctuous bodies. To this ether are ascribed the principal phenomena of attraction and repulsion; the light, the phosphorous or rather phosphoreal smell which violent electricity is always attended, and other sensible qualities, are ascribed to the grofer particles of bodies driven from them by the forcible action of this ether. He also endeavours to explain many electrical phenomena by means of a subtle medium at the surface of all bodies; which is the cause of the refraction and reflection of the rays of light, and also refits the entrance and exit of this ether. This medium, he says, extends to a small distance from the body, and is of the same nature with what is called the electric fluid. On the surface of conductors this medium is rare, and easily admits the passage of the electric fluid; whereas, on the surface of electrics, it densifies and refists it. The same medium is rarefied by heat, which thus changes conductors into non-conductors. By far the greater number of philosophers, however, rejected the opinion of Mr Wilson; and as they neither chose to allow the electric fluid to be fire nor ether, they were obliged to own that it was a fluid sui generis, i.e. one of whose nature they were totally ignorant.

But while philosophers were thus embarrassed in their electrical theories, a vast number of interesting phenomena were discovered by the affability of a number of different electricians in different countries. Mr Winkler, for instance, observed, that if glass was rubbed on the inside,
side, it would show strong appearances of electricity on the outside: which seemed to favor the opinion of the permeability of glass to the electric matter. Other German electricians used several globes at a time, and imagined they found effects proportionable; tho' this has since been found a mistake. Such a prodigious force, however, could they excit by means of these globes whirled by a large wheel, and rubbed by the hand or with woollen cloth, that, according to their own accounts, blood could be drawn from a finger by means of the electric spark, the skin would burst, and a wound appear as if made by a cauticle. If several globes or tubes were used, they said, that the motion of the heart and arteries would be very perceptibly increased in such as were electrified; and that, if a vein was opened in these circumstances, the blood issuing from it would appear like liquid phosphorus, and run out faster than when the person was not electrified. Mr P. Gordon, a Scots Benedicoline monk, and professor of philosophy at Erfurt, increased the electric spark to such a degree, that they were felt from a man's head to his foot, so that he could hardly take them without falling down with giddiness, and small birds were killed by them. This was effected by conveying the electricity with iron wires to the distance of 200 ells from the place of excitation. He also found that the sparks were stronger when the wires were thicker than when they were small.

While the power of electricity was thus tried, another question of great importance was likewise decided, namely, Whether electricity acted according to the largeness of the surface of bodies? This was found to be in proportion to the surface, and not the solid contents. The magnetic effects also were found not to interfere in the least with the electrical ones. An electrified loadstone attracted light bodies of all kinds by its electric virtue, at the same time that it attracted iron and steel by its peculiar magnetic virtue. The attractive virtue of electricity was also found to pervade glasses so powerfully, that a thread was attracted through five exhausted receivers, and seemingly with more vigour than it would have been by the excited tube alone in the open air.

Such was the state of philosophical opinions concerning electricity, when Dr Franklin first invented his theory concerning positive and negative, or plus and minus, electricity. This had been already suggested by Dr Watson, but was not so fully explained by him as by Dr Franklin; on which account the latter is generally reckoned to be the sole inventor. According to this theory, all the operations in electricity depend upon one fluid sui generis, extremely subtle and elastic. Between the particles of this fluid there subsists a very strong repulsion with regard to each other, and as strong an attraction with regard to other matter. Thus, according to Dr Franklin's hypothesis, one quantity of electric matter will repel another quantity of the same, but will attract and be attracted by any terrestrial matter that happens to be near it. The pores of all bodies are supposed to be full of this subtle fluid; and when its equilibrium is not disturbed, that is, when there is in any body neither more nor less than its natural share, or than that quantity which it is capable of retaining by its own attraction, the fluid does not manifest itself to our senses. The action of the rubber upon an electric disturbs this equilibrium, occasioning a deficiency of the fluid in one place, and a redundancy of it in another. This equilibrium being forcibly disturbed, the mutual repulsion of the particles of the fluid is necessarily excited to restore it. If two bodies be both of them overcharged, the electric atmospheres repel each other, and both the bodies recede from one another to places where the fluid is less dense. For as there is supposed to be a mutual attraction between all bodies and the electric fluid, such bodies as are electrified must go along with their atmospheres. If both the bodies are exhausted of their natural share of this fluid, they are both attracted by the denser fluid existing either in the atmosphere contiguous to them, or in other neighboring bodies; which occasions them still to recede from one another as if they were overcharged.

This is the Franklinian doctrine concerning the cause of electric attraction and repulsion; but it is evident, concerning the reason just now given why bodies negatively electrified ought to repel one another, is by no means satisfactory. Dr Franklin himself had framed his hypothesis before he knew that bodies negatively electrified would repel one another; and when he came after to learn it, he was surprized, and acknowledged that he could not satisfactorily account for it.

Other philosophers, therefore invented different solutions of this difficulty, of which that abovementioned is one. But by some this was rejected. They said, that as the denser electric fluid, surrounding two bodies negatively electrified, acts equally on all sides of those bodies, it cannot occasion their repulsion. The repulsion, according to them, is owing rather to an accumulation of the electric on the surfaces of the two bodies; which accumulation is produced by the attraction, and the difficulty the fluid finds in entering them. This difficulty is supposed chiefly to be owing to the air on the surface of bodies, which Dr Priestley says is probably a little condensed there. This he deduces from an experiment of Mr Wilson, corrected by Mr Canton. The experiment was made in order to observe the course of the electric light through a Torricellian vacuum. A singular appearance of light was observed upon the surface of the quicksilver, at which the fluid was supposed to enter. Mr Wilson supposed that this was owing to a subtle medium spread over the surface of the quicksilver, and which prevented the easy entrance of the electric fluid. But this was afterwards discovered by Mr Canton to be owing to a small quantity of air which had been left in the tube. It is plain, however, that as the attraction is equal all round, and likewise the difficulty with which the fluid penetrates the air, bodies negatively electrified ought not to repel one another on this supposition more than the former. Nay, they ought to attract each other; because, in the place of contact, the resistance of the air would be taken off, and the electric fluid could come from all other quarters by the attraction of the bodies.

Mr Cavallo, who seems to have undertaken the defense of this hypothesis in all cases, gives another reason why bodies negatively electrified should repel each other. In a chapter intitled, "A Compendious View of the principal properties of Electricity," among others he gives the following: "No electricity can be
theory. 1f you don't understand what's being said, you might try rephrasing it in your own words or asking for clarification.
Theor y.

with which it communicates. By this operation, therefore, the electric fluid becomes almost entirely exhausted on one side of the plate, while it is as much accumulated on the other; and the discharge is made by the electric fluid rushing, as soon as an opportunity is given it by means of proper conductors, from the side which was overloaded to that which is exhausted.

It is not, however, necessary to this theory, that the very same individual particles of electric matter which were thrown upon one side of the plate, should make the whole circuit of the intervening conductors, especially in very great distances, as actually to arrive at the exhausted side. It may be sufficient to suppose, that the additional quantity of fluid displaces and occupies the space of an equal portion of the natural quantity of fluid belonging to those conductors in the circuit which lay contiguous to the charged side of the glass. This displaced fluid may drive forwards an equal quantity of the same fluid in the next conductor; and thus the progres may continue till the exhausted side of the glass is supplied by the fluid naturally existing in the conductors contiguous to it. In this case, the motion of the electric fluid, in an explosion, will rather resemble the vibration of the air in sounds, than a current of it in winds.

It will soon be acknowledged (fays Dr Priestley), that while the substance of the glass is supposed to contain as much as it can possibly hold of the electric fluid, no part of it can be forced into one of the sides without obliging an equal quantity to quit the other side: but it may be thought a difficulty upon this hypothesis, that one of the sides of a glass plate cannot be exhausted, without the other receiving more than its natural share; particularly, as the particles of this fluid are supposed to be repulsive of one another. But it must be considered, that the attraction of the glass is sufficient to retain even the large quantity of electric fluid which is natural to it, against all attempts to withdraw it, unless that eager attraction can be satisfied by the admission of an equal quantity from some other quarter. When this opportunity of a supply is given, by connecting one of the coatings with the rubber, and the other with the conductor, the two attempts to introduce more of the fluids into one of the sides are made, in a manner, at the same instant. The action of the rubber tends to disturb the equilibrium of the fluid in the glass; and no sooner has a spark quitted one of the sides, to go to the rubber, than it is supplied by the conductor on the other; and the difficulty with which these additional particles move in the substance of the glass, effectually prevents its reaching the opposite exhausted side. It is not faid, however, but that either side of the glass may give or receive a small quantity of the electric fluid, without altering the quantity on the opposite side. It is only a very considerable part of the charge that is meant, when one side is said to be filled while the other is exhausted.

It is a little remarkable, adds Dr Priestley, that the electric fluid, in this and in every other hypothesis, should do much resemble the ether of Sir Isaac Newton in some respects, and yet differ from it so essentially in others. The electric fluid is supposed to be, like ether, extremely subtle and elastic, that is, repulsive of itself: but instead of being, like the ether, repelled by all other matter, it is strongly attracted by it: so that, far from being, like the ether, rarer in the small than in the large pores of bodies, rarer within the bodies than at their surfaces, and rarer at their surfaces than at any distance from them; it must be denser in small than in large pores, denser within the substance of bodies than at their surfaces, and denser at their surfaces than at a distance from them.

To account for the attraction of light bodies, and other electrical appearances, in air of the same density with the common atmosphere, where glasses which are supposed to be impermeable to electricity) is interrupted; it is conceived, that the addition or subtraction of the electric fluid, by the action of the excited electric on one side of the glasses, occasions, as in the experiment of the Leyden phial, a subtration or addition of the fluid on the opposite side. The state of the fluid, therefore, on the opposite side being altered, all light bodies within the sphere of its action must be affected in the very same manner as if the effluvia of the excited electric had actually penetrated the glasses, according to the opinions of all electricians before Dr Franklin.

This hypothesis has been in some measure improved by Mr. Aepinus, in a treatise intitled, "Tentamen Theoricae Electricitatis & Magnetismi." He extends the property of impermeability to air, and all electrics, as well as glass. He supposes impermeability to consist in the great difficulty with which electric substances admit the fluid into their pores, and the flow ures with which it moves in them. In consequence of this impermeability of air to the electric fluid, he denies the existence of electric atmospheres, and thinks that Dr Franklin's theory will do much better without them. He also imagines, that all the particles of matter are repulsive of one another: for that otherwise (since all substances have in them a certain quantity of the electric fluid, the particles of which repel one another and are attracted by all other matter), it could not happen, that bodies in their natural state with respect to electricity, should neither attract, nor repel each other. He also introduces a number of mathematical calculations, the result of which (fays Dr Priestley, with a great deal of probability) cannot be depended upon.

The above is a full explanation of the theory of electricity at present most generally received. It depends on the following principles. 1. All terrestrial substances, as well as the atmosphere which surrounds the earth, are full of electric matter. 2. Glasses, and other electric substances, though they contain a great deal of electric matter, are never the less impermeable by it. 3. This electric matter violently repels itself, and attracts all other matter. 4. By the excitation of electricity, the equilibrium of the fluid contained in it is broken: and one part of it is overloaded with electricity, while the other contains too little. 5. Conducting substances are permeable to the electric matter through their whole substance, and do not conduct it merely over their surface. 6. Positive electricity is when a body has too much of the electric fluid, and negative electricity when it has too little. Of these positions we shall now adduce those proofs drawn from different
different facts, which seem in the strongest manner to confirm them.

I. "All terrestrial substances, as well as the atmosphere which surrounds the earth, are filled with electric fluid."—Of this the proofs are very easy. There is no place on the earth or sea, where the electric fire may not be excited by making a communication between it and the rubber of an electric machine. Therefore considering that the whole earth is moist, that moisture is a conductor of electricity, and that every part of the earth must thus communicate with another, it is certain that the electric matter multi diffuse itself as far as the moisture of the earth reaches; and this we may reasonably suppose to be to the very centre.

With regard to the atmosphere, the case is equally clear. We have formerly mentioned in general, that Dr. Franklin, and others, had collected electricity from the atmosphere in great quantity during the time of thunder-forms; but it is now found that it may be collected from the air at any time. The best instrument for this purpose is the electrical kite. Mr. Cavallo, who hath made a great many experiments in atmospheric electricity, observes that the whole power of this machine lies in the firing. A common school-boy's kite answers the purpose as well as any other. The best method of making the firing is by twisting two threads of common twine with one of that copper-thread which is used for trimmings. When a kite constructed in this manner was raised, he says, he always observed the firing to give signs of electricity, except once. The weather was warm, and the wind so weak, that the kite was raised with difficulty, and could hardly be kept up for a few minutes. Afterwards, however, when the wind increased, he obtained, as usual, a pretty strong positive electricity. Concerning the management of this kite he gives the following directions.

"In raising the kite, when the weather is very cloudy and rainy, in which time their is danger of meeting with a great quantity of electricity, I generally use to fire, as the firing of a kite is done, by taking a copper thread by the hook of a chain C, the other extremity of which falls on the ground. Sometimes I use another caution besides, which is to stand upon an insulated stool; in which situation, I think, that if any quantity of electricity, suddenly discharged by the clouds, strikes the kite, it cannot much affect any person. As to insulated reels, and other such like instruments that some gentlemen have used to raise the kite without any danger of receiving a shock; fit for the purpose as they may appear in theory, they are yet very inconvenient to be managed. Except the kite be raised in the time of a thunder-form, there is no great danger for the operator to receive any shock. Although I have raised my electrical kite hundreds of times without any caution whatever, I have very seldom received a few exceedingly slight shocks in my arms. In time of a thunder-form, if the kite has not been raised before, I would not advise a person to raise it while the stormy clouds are just overhead; the danger at such a time being very great, even with the precautions above-mentioned: at that time the electricity of the clouds may be observed, without raising the kite, by a cork-ball electrometer held in the hand in an open place, or, if it rains, by the electrometer for rain, to be described hereafter.

"By making use of this instrument, I am obliged to keep the kite up no longer than it is necessary to charge the phial, in order to observe the quality of the electricity in the atmosphere; for after the kite has been drawn in, and brought home, I can then examine the electricity of the inside of the phial, which is the same as that of the kite. When the electricity of the kite is very strong, I fix a chain communicating with the ground, at about six inches distance from the firing, which may carry off its electricity in case this should increase so much as to put the by-standers in danger."

With all his caution, however, it seems Mr. Cavallo Great could not always avoid danger, even when there was quantity of electricity brought down from a cloud. He says, Mr. Cavallo Great is by no means afraid of the phials after they have been charged, and the atmosphere in a temperate degree of heat. In these circumstances, at three P.M. I raised my electrical kite with 360 feet of firing. After the end of the firing had been insulated, and a leather ball covered with tin-foil had been hanged to it, I tried the power and quality of the electricity, which appeared to be positive and pretty strong. In a short time, a small cloud passing over, the electricity increased a little; but the cloud being gone, it decreased again to its former degree. The firing of the kite was now fastened by the silk lace to a post in the yard of the house, and I was repeatedly charging two coated phials and giving shocks with them. While I was so doing the electricity, which was still positive, began to decrease, and in two or three minutes it became so weak that it could hardly be perceived with a very sensitive cork-ball electrometer. Observing at the same time, that a large and black cloud was approaching the zenith (which, no doubt, caused the decrease of electricity), indicating imminent rain, I introduced the end of the firing through a window in a first-floor room; and when the cloud arrived, I fastened it by the silk lace to an old chair. The quadrant electrometer was set upon the same window, and was by means of a wire connected with the firing of the kite. Being now three quarters after three o'clock, the electricity was absolutely imperceptible; however in about three minutes it became again perceptible; but upon trial, was now found to be negative. It is therefore plain, that its stopping was nothing more than a change from positive to negative; which was evidently occasioned by the approach of the cloud, part of which by this time had reached the zenith of the kite, and the rain also had begun to fall in large drops. The cloud also came farther off; the rain increased; and the electrometer keeping pace with it, the electrometer soon arrived at 15°. Seeing now that the electricity was pretty strong, I began again to charge the two coated phials, and to give shocks with them; but the phials had not been charged above three or four times, before I perceived that the index of the electrometer was arrived at 35°, and was keeping still increasing. The shocks being now very smart, I diffused from charging the phials any longer; and, considering the rapid advance of the electricity, thought to take
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**E L E C T R I C I T Y.**

"4. That in a more elevated place the electricity is stronger than in a lower one; for having tried the atmospheric electrometer both in the stone and iron gallery on the copula of St Paul's cathedral, I found that the balls diverged much more in the latter than in the former less elevated place. Hence it appears, that if this rule takes place at any distance from the earth, the electricity in the upper regions of the atmosphere must be exceedingly strong."

The conclusions drawn from the experiments with the kites, are as follow.

"1. The air appears to be electrified at all times; its electricity is constantly positive, and much stronger in frosty than in warm weather; but it is by no means felt in the night than in the day time.

"2. The presence of the clouds generally lessens the electricity of the kite; sometimes it has no effect upon it; and it is very seldom that it increases it a little." To this the abovementioned instance is a most remarkable exception.

"3. When it rains, the electricity of the kite is generally negative. To prevent this, use a metallic shoe."

"4. The aurora borealis seems not to affect the electricity of the kite."

"5. The electric spark taken from the firing of the kite, or from any insulated conductor connected with it, especially when it does not rain, is very seldom longer than a quarter of an inch; but it is exceedingly portentous. When the index of the electrometer is not higher than 20°, the person who takes the spark will feel the effect of it in his legs; it appearing more like the discharge of an electric jar than the spark taken from the prime conductor of an electrical machine."

"6. The electricity of the kite is generally stronger or weaker, according as the firing is longer or shorter; but it does not keep any exact proportion to it. The electricity, for instance, brought down by a firing of 100 yards, may raise the index of the electrometer to 20, when, with double that length of firing, the index of the electrometer will not go higher than 25."

"7. When the weather is damp, and the electricity is pretty strong, the index of the electrometer, after taking a spark from the firing, or pressing the knob of a coated phial to it, rives surprizingly quick to its usual place; but in dry and warm weather it rives exceedingly slow."

"8. The second position requisite for establishing Dr Franklin's theory is, that glass and other electric substances, though they contain a great deal of electric matter, are nevertheless impermeable by it. This assertion evidently has a contradictory appearance. It is very difficult, if not impossible, to conceive, that any substance can be full of a fluid, and yet impermeable by that fluid; especially when we continually talk of putting in an additional quantity into one side, and taking out of the other. Nay, what is still more extraordinary, the thinner the glass is, i.e. the less quantity of electric matter it can contain, the more we are able to put into it; for the thinner a glass is, the more easily does it receive a high charge."

The chief arguments for the impermeability of glass are drawn from the phenomena of the Leyden phial. It is indeed very plain, that there is in that case an expulsion of fire from the outside at the
The same time that it is thrown upon the inside. This appears from numberless experiments, but is most readily observable in the following. Let a coated phial be set upon an inflating stand, and the knob of another phial brought near the coating of the first. As soon as the electric sparks are discharged from the prime conductor to the knob of the first bottle, an equal number will be observed to proceed from the coating of the first to the knob of the second. This is very remarkable, and an unphilosophical observer will be scarce ever to conclude, that the fire runs directly through the substance of the glass. Dr Franklin, however, concludes that it does not, because there is, indeed, very great accumulation of electricity on the inside of the glass, which discovers itself by a violent flash and explosion when a communication is made between the outside and inside coatings. But it must be observed, that there is here no other reason for concluding the glass to be impermeable, except that we suppose the electric matter to be accumulated on one side of the glass, and deficient on the other. If this supposition therefore cannot be proved, the evidence of fire, which is indeed very strong in favor of the permeability, must undoubtedly preponderate. It is said, indeed, that if the glass was permeable by the electric matter, a phial would be discharged immediately after being charged, or rather could never be charged at all; because the matter would no sooner be thrown upon one side than it would fly off from the other. This supposition, however, depends entirely upon the above-mentioned one, namely, that in bodies positively electrified there is an accumulation, and in such as are negatively electrified there is a deficiency of fluid; which never can be proved.

Another argument against the permeability of glass and other electrics is, that coated phials, it is said, standing upon electrical substances, cannot be charged. This, however, seems to very much exaggerated. A phial though ever so perfectly inflated, will always receive a charge from a machine which acts very powerfully. Nay, it is certain, that though a phial is placed in such a manner, that both its knob and outside coating are in contact with the prime conductor, it will still receive a charge; much less indeed in this case than in any other, but still the shock will be perceptible.

In 1759, Mr. Wilson read a paper before the Royal Society, in which the permeability of glass by the electrical fluid was asserted. The experiments from which he deduced this conclusion were the following. He took a very large pane of glass, a little warmed; and holding it upright by one edge, while the opposite edge rested upon wax, he rubbed the middle part of the surface with his finger, and found both sides electrified plus. He accounted for this from the electrical fluid passing through the glass from his finger to the opposite side. But here Dr. Priestley observes, that on Franklin's principles it ought to be so. If one side be rubbed by the finger, it acquires from it some electric fluid. This being spread on the glass as far as the rubbing extended, repels an equal quantity of that contained in the other side of the glass, and drives it out on that side, where it stands as an atmosphere, so that both sides are found positively electrified. Mr. Wilson also tried another experiment, which seemed more decisive than the former: Having by him a pane of glass, one side of which was rough and the other smooth, he rubbed it slightly on one side; upon doing which, both sides were electrified minus. This also Dr. Priestley attempts to reconcile with Franklin's hypothesis.

"As the electric fluid, contained in the glass (says he), is kept equal in both sides by the common repulsion; if the quantity in one side is diminished, the fluid in the other side, being less repelled, retires inward, and leaves that surface also minus." But here it is impossible to avoid observing, that Dr. Priestley's own words, in the strongest manner militate against the doctrine he means to establish. The quantity of fluid in one side being diminished, that on the other, he says, retires inward. But into what does it retire? if into the substance of the glass, then the glass is undoubtedly permeable by it; and this is the very thing which Dr. Priestley argues against.

III. "The electric matter violently repels itself, and acts on all other matter." The proofs of this position of the fluid cannot be are chiefly derived from the following experiment, and others of a similar kind. Let a smooth piece of metal be electrified, and bring an excited glass tube near one end of it. A spark of positive electricity will be obtained from the other end; after which, if the tube is suddenly removed, the metal becomes electrified negatively. Here, then, it is said, is a plain repulsion of one part of the electric fluid by another. That contained in the tube repels the fluid contained in the nearest end of the metal; of consequence it is accumulated in the other end, and when the tube is removed, the metal is found to be deprived of part of its natural quantity of electricity, or is electrified negatively. On such experiments as this, however, it is obvious to remark, that we ought first to prove that positive electricity confines in an accumulation, and negative electricity in a deficiency, of the electric fluid. But while this is only supposed, it is impossible that any proofs drawn from the supposition can be conclusive.

IV. "By the excitation of an electric, the equilibrium of the fluid contained in it is broken, and one part is overloaded with electricity, while the other contains too little." This position is entirely hypothetical. No electrician hath yet explained, in a satisfactory manner, how the fluid is procured by the excitation of glass or any other electric substance. Dr. Priestley, instead of giving an explanation, proposes several queries concerning it. Mr. Cavallio tells us, that the act of excitation pumps as it were the electric fluid from the rubber, and consequently from the earth. He adds "By what mechanism one body extracts the electric fluid from another, is not yet known. The celebrated Father Beccaria supposes, that the action of rubbing increases the capacity of the electric, i.e. renders that part of the electric which is actually under the rubber, capable of containing a greater quantity of electric fluid; hence it receives from the rubber an additional share of fluid, which is manifested upon the surface of the electric, when that surface is come out of the rubber; in which state it loses, or as it were, contracts its capacity. Signor Beccaria's experiment to prove this supposition is the following. He caused a glass plate to be rubbed by a rubber applied on one side of the plate, while it was turning vertically; and holding at the same time a linen thread on the other side of the plate
Whether the electric fluid pervades the substance of conductors.

V. "Conducting bodies are permeable by the electric fluid through the whole of their substance, and do not conduct it merely over their surface." The proof most commonly adduced in favour of this position, is the following experiment. Take a wire of any kind of metal, and cover part of it with some electric substance, as rosin, sealing-wax, &c. then discharge a jar through it, and it will be found that it conducts as well with as without the electric coating. This, says Mr. Cavallo, proves that the electric matter passes through the substance of the metal, and not over its surface. A wire, adds he, continued through a vacuum, is also a convincing proof of the truth of this assertion. Even here, however, the proof, if impartially considered, will be found very defective. It is a fact agreed upon by all philosophers, that bodies which to us are apparently void of evidence, have the power of passing through the whole of their substance, and do the part of the chain that had been doubled was marked with a black ilain, wherever it had touched it. Whatever part of Dr. Franklin's hypothesis rests on this supposition concerning excitation, are entirely void of evidence.

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No. 3

Theory.

Plate just opposite to the rubber, he observed that the thread was not attracted by that part of the glass which corresponded to the rubber, but by that which was opposite to the surface of the glass that had just come out from the rubber; which shows, that the fluid acquired by the glass plate did not manifest its power until the surface of the glass was come out from the rubber." But from this experiment it seems impossible to draw any conclusion concerning the capacity of glasses either one way or other. It is evident, therefore, that whatever parts of Dr. Franklin's hypothesis rest on this supposition concerning excitation, are entirely void of evidence.

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VI. An Inquiry into the Nature of the Electric Fluid; with an attempt to explain the principal Phenomena of Electricity, from the known Laws by which other Fluids are observed to act upon one another.

In making this inquiry, or indeed any other, it is proper to take for granted as little as possible. No position should be assumed as the basis of any reasoning whatever, except what has been proved by inconceivable facts. In the present case, therefore, it is sufficient to assume as a fact what has been already proved by innumerable experiments, namely, That the air, the earth, and sea, all contain great quantities of electric fluid. The question which most naturally suggests itself when this is once admitted, is, Whence hath the electric fluid come? Is it essentially inherent in these bodies, or hath it come from without? This cannot be resolved, without considering the nature of the fluid itself, and whether it is analogous to any other which is more generally known.

§ 1. Proofs of the Identity of the Electric and Elementary Fire or Light of the Sun.

The similarity between the electric matter and fire, naturally suggested to the first observers, that it was no other than elementary fire, which pervaded all substances, as we have already mentioned. This, however, was objected to; and the principal objection was, that though the electric matter emitted light, and had the appearance of fire, it nevertheless wanted its most essential quality, namely, burning. In particular, the blast which comes from an electrified point, feels cold instead of being hot; and where great quantities of the fluid are forced with violence through certain substances, and thus let them on fire, it was thought that the fire might be occasioned by the internal combustion excited among their small particles. This objection, however, seems now to be totally removed. The dispute concerning the preferable utility of pointed or knobbed conductors for securing buildings from lightning, occasioned the fitting up of a more magnificent apparatus than had ever appeared before. An immense conductor was constructed at the expence of the board of ordnance, and suspended in the Pantheon. It consisted of a great number of drums covered with tinfoil, which formed a cylinder of about 155 feet in length, and more than 16 inches in diameter; and to this vast conductor were occasionally added 4,800 yards of wire. The electric blast from this machine fired gun-powder in the most unfavourable circumstances that can be imagined, namely, when it was drawn off by a sharp point, in which case it has generally less force than in any other. The method of doing this was as follows. Upon a staff of baked wood a stem of brass was fixed, which terminated in an iron point at the top. This point was put into the end of a small tube of Indian paper, made somewhat in form of a cartridge, about an inch and a quarter long, and two-tenths of an inch in diameter. When the cartridge was filled with common gun-powder, unbruised, a wire communicating with the earth was then fastened to the bottom of the brass stem. The charge in the great cylinder being continually kept up by the motion of the wheel, the top of the cartridge was brought very
very near the drums, so that it frequently even touched the tin-foil with which they were covered. In this situation a small faint luminous stream was frequently observed between the top of the cartridge and the metal. Sometimes this stream would set fire to the gun-powder the moment it was applied; at others, it would require half a minute or more before it took effect. But this difference in time was supposed to be owing to some small degree of moisture in the powder or the paper, which was always unfavourable to the experiment. Tinder was fired much more readily.

As it therefore appears, that the electric fluid, when it moves through bodies either with great rapidity, or in very great quantity, will set them on fire, it seems scarce disputable, that this fluid is the same with the element of fire. For further proofs of this opinion, which is now adopted by some very eminent philosophers, see the articles Fire and Heat. See also Chemistry-Index. This being once admitted, the question arises, whether the electric fluid is derived into the earth and atmosphere, must be exceedingly evident, being no other than the sun, or source of light itself. The vast quantity of light which continually comes from him to the earth must of necessity be absorbed by that opaque body, at least in great part. It is impossible it can remain there, because there is a perpetual succession of new quantities coming from the sun. It must be observed, however, that as this fluid receives a great number of different directions after once it enters the earth, it cannot appear in its natural form of fire or light, till it receives a new motion similar to what it had when proceeding from the sun. The solar light only burns, or produces heat, when diverging from a centre, or converging towards one. The heat is always greatest at the central point; and even there, no heat is produced except where the light passes through a resisting medium. In those cafes likewise the electric fluid burns. When discharged with violence from an electrified bottle, it flies out on all sides, and then will set fire gun-powder, or other combustible substances. The fame thing it will do when converging towards a point, if in sufficient quantity, as was observed in the experiment with the large conductor abovementioned. But when the electric fluid neither meets with any considerable resistance, diverges from a centre, nor converges towards one, it is almost always invisible, and without heat. A most remarkable proof of this we have, even when a vast quantity of electric matter is forced to go through a very small wire. Dr Priestley tells us he had once such a case, where the wire was almost entirely conducted, and remained only an inch long. Upon discharging a battery of 50 square feet thro' an iron wire nine inches long, the whole of it was glowing hot, and continued so for some seconds. The middle part grew cool first, while both the extremities were febrile red. When the wire was afterwards examined, both the extremities were found quite melted; an inch or two of the part next to them was extremely brittle, and crumbled into small pieces on being handled; while the middle part remained pretty firm, but had quite lost its polish, so that it looked darker than before. This is precisely what would have happened, had both ends been put into a common fire.

We are very sure, that the same quantity of electric matter passed through the middle of the wire, that entered one end of it and went out at the other. Why then did it not produce the same degree of heat in the middle that it did at each end? The reason is plain: At one end it was in a state of convergence from the battery to the point of the wire; at the other, it was in a state of divergence from the point of the wire to the battery. At the points, therefore, an intense heat was produced; but in the middle, where the fluid neither converged nor diverged, but moved forwards in a parallel direction, the heat was much less. Now we know that this is the case with the solar light itself. At the focus of a burning-glass there is an intense heat both where the convergence ends and the divergence begins. But where this divergence considerably ceases, and the motion of the light becomes more parallel, the heat is vastly diminished. The case is the same with a common fire, and with all burning bodies; for heat never acts but from a centre, and is always greatest at the central point. It is true, that we cannot produce electric fire without at the same time producing a violent shock exceedingly different from the burning of common fire. But the reason of this is, that we cannot produce a divergence in a stream of electric matter, without at the same time giving it such a motion in some other direction, that its impetuosity becomes very perceptible. If it was in our power to make the flash produced by an electric bottle keep its place, we cannot suppose that any shock, or other sensation than heat, would be felt. But there is no possibility of hindering it from flying with prodigious celerity from one side of the bottle to the other. Therefore, as it is neither in a state of divergence nor convergence, except where it comes out from and enters into the bottle, no sensation is perceived except what arises from its change of place; and hence it is said, that the electric matter hath no heat.

§ 2. The Identity of Electric Matter and Light further considered; with some positive proofs, that Electric Substances are actually penetrated by the Electric Fluid.

The only objection of any strength which can arise to the identity of the electric fluid and light is, the surprising case with which the latter penetrates glass, and the seeming stop which is put to the motions of the former when a piece of glass or any other electric substance is presented to it. Here, however, it must be observed, that light, as proceeding from a luminous body, must be regulated by very different laws from light which is absorbed by opaque bodies, and consequently subjected to motions quite different from what it originally had. Water, the only fluid with which we are very well acquainted (the others we know seem to be regulated by the same laws), is capable of two very different motions. The one is a rectilinear, by which great quantities of it run from one place to another. The other is not so easily explained. It may, however, be very readily observed, by throwing a small stone into a pool of water. A great number of concentric circles will be propagated from the place where the stone fell, as from a centre, which will gradually grow larger and larger. If another stone is thrown in at some distance, similar circles will proceed from the place where it fell. These will meet with the former,
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86 Surprising experiments concerning the transparency of bodies, have shown that this is not the cafe. Sealing-wax and pitch are as opaque bodies as we are acquainted with; yet in Mr Haukbee's experiments, mentioned n° 4, these substances were both rendered transparent by the action of the electric fluid. These experiments are confirmed by some others still more surprising, mentioned by Dr Priestley. See also below sect. VIII. One was made by S. Beccaria. He discharged an electric shock through some brass dust sprinkled between two plates of sealing-wax. The whole was perfectly luminous and transparent. The most extraordinary experiment, however, was made by Dr Priestley himself, of which he gives the following account: "I laid a chain in contact with the outside of a jar lightly on my finger, and sometimes kept it at a small distance by means of a thin piece of glass; and, if I made the discharge at the distance of about three inches, the electric fire was visible on the surface of the finger, giving it a sudden concussion, which seemed to make it vibrate to the very bone; and when it happened to pass on that side of the finger which was opposite to the eye, the whole seemed perfectly transparent in the dark."

87 Consequences from them.

Experiments of this kind, though they have not hitherto been much purged by electricians, seem to be more worthy of notice than almost all others. One consequence which may be derived from them is, that there is in bodies, whether electric or non-electric, a certain subtle medium, on the motion of which transparency depends. That is, when the medium is at rest, the body is opaque; but when set in motion, it becomes transparent. This motion, we see, may be given in two different ways. One is by simple electrification in vacuo, according to Mr Haukbee's experiments. The other is, by passing the stream of an electrified bottle over their surface. In Dr Priestley's experiments, he could determine the motion to be of the vibratory kind; and hence we may safely conclude, that some bodies may be constituted in such a manner, that they are capable of transmitting the vibrations of this fluid, but not any other kind of motion. Such kinds of bodies will be naturally transparent; but others, whose particles are dislocated in such a manner, that the vibrations cannot be propagated thro' them without considerable violence, are naturally opaque.

88 Light produced to be a vibration of the electric fluid and light are the same; for no two fluids are always capable of setting one another in motion fluid, precisely in the same manner, unless their nature is in all respects exactly the same.

These experiments seem in the strongest manner to prove the identity of the electric fluid and light, and that both are transmitted through electric as well as other substances. The reason, therefore, of the seeming stop, which is observed in our electrical operations by the intervention of glass, is, that in all artificial electricity, the fluid has a very considerable progresive motion, which cannot be easily propagated through the solid substance of any body, especially where there is a pretty strong resistance on the other side; which shall afterwards be shown to be the cause of this fluid when passing through electric substances.

§ 3. Of the Passage of the Electric Fluid over the Surface, and through the Substances, of different Bodies.

Dr Priestley hath made many very curious experiments concerning the discharging of electric shocks by the escape over the surface of different bodies, and thereby finds, that by this means a battery may be made to discharge itself, at a much greater distance than it would do if sent directly through the air. The experiments were begun with ice, and he first incidentally discovered, that, when the shock of a common jar was discharged on a plate of ice, it would sometimes run over the surface and strike the chain directly on the other side. With a single jar, however, the distance was not much greater than what it would have passed over in the usual way; but, with a battery, it exceeded the usual distance in a very great degree. Endeavouring to make a circular spot, such as he had formerly made on metals, upon a piece of raw flesh, he took a leg of mutton, and laying the chain that communicated with the outside of the battery over the flank, he took the explosion on the outward membrane, about seven inches from the chain, but was greatly surprised to observe the electric fire not...
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to enter the flesh, but to pass in a body along the surface of it to come to the chain. Thinking that this might be occasioned by the fatty membrane on which the explosion was made, he again laid the chain in the same manner over the hand, and took the explosion upon the muscular fibres, where they had been cut off from the rest of the body; but still the fire avoided entering the flesh, made a circuit of near an inch round the edge of the joint, and passed along the surface to come to the chain as before, though the distance was near 11 inches. Imagining that this effect was promoted by the chain lying lightly on the surface of the flesh, and therefore not actually in contact with it, he took another explosion upon the hook of the chain, which was thrust into the flesh. On this the fire entered the mutton; and as he held it in his hands, both his arms were violently shocked up to his shoulders.

The Doctor next determined to try the effect of different conducting substances in the same manner; and of those was the most obvious. "Next day, (says he,) I laid a brass rod, a foot long, without communicating with the outside of the battery, very near the surface of a quantity of water (to resemble the chain lying upon the surface of the flesh, without being in contact with it), and, by means of another rod furnished with knobs, made a discharge on the surface of the water, at the distance of several inches from any part of the rod; when the electric fire struck down to the water, and, without entering it, passed visibly over its surface till it arrived at that part of the rod which was nearest the water, and the explosion was exceedingly loud. If the distance at which I made the discharge exceeded seven or eight inches, the electric fire entered the water, making a beautiful flame upon its surface, and yielding a very dull sound. When I first made this experiment of the electric flash passing over the surface of water, I thought it necessary, that neither the piece of metal communicating with the outside, nor that communicating with the inside of the jars, should touch the water immediately before the discharge. But I afterwards found, that the experiment would answer, tho' either, or even both of them, were dipped in the water: for, in this case, the explosion would still prefer the surface to the water itself; if the distance was not very great, and would even pass at a greater distance along the surface, when there was a nearer passage from one rod to the other in the water."

He afterwards tried to pass the electric flash over the surfaces of a great number of different bodies, but found it impossible with many of them. He therefore imagined that this property of conducting a flash over its surface was peculiar to water and raw flesh. It was found, however, that the flash passed over the surface of a touch-flone, and likewise over a piece of the best kind of iron ore, exceedingly smooth on some of its sides. The piece was about an inch thick, and three inches in its other dimensions. The full charge of a jar of three square feet would not enter it. The explosion passed over the surface of oil of vitriol, with a dull found and a red colour; but in all other cases, if it passed at all, it was in a bright flame, and with a report peculiarly loud. It passed over the surface of the most highly rectified spirit of wine without firing it; but when too great a distance was taken, the electric fire entered the spirit, and the whole was in a blaze in a moment.

This was the case when such substances were employed as are but indifferent conductors of electricity; raw flesh for instance, water, &c. When good conductors were used, such as charcoal of different kinds, no remarkable appearances were produced. So far was the shock from passing visibly over the surface of any metal, that, if the distance through the air, in order to a passage through the metal, was even so little nearer than the distance between the two surfaces, it never failed to enter the metal; so that its entering the surface of the metal, and coming out again, seemed to be made without obstruction. If as much water was laid on a smooth piece of brass as could lie upon it, it would not go over the surface of the water, but always struck through the water into the metal. But if the metal lay at any considerable depth under the water, it would prefer the surface. It even passed over three or four inches of the surface of water as it was boiling in a brass pot, amidst the steam and bubbles, which formed no hindrance to it. Animal hairs, however, of all kinds, seemed peculiarly to favour this passage of the electric matter over their surface; and the report of these explosions was manifestly louder than when water was used. In all cases of this kind, the report was considerably louder than when the discharge was made in the common way. The explosions were observed by persons out of the house, and in a neighbouring house, very much to resemble the smart cracking of a whip. "But (says Dr Priestley) the sound made by these explosions, though by far the loudest that ever I heard of the kind, fell much short of the report made by a single jar, of no very great size, of Mr Rackford's, who says, that it was as loud as that of a pistol." He also observes, that when the electrical explosion does not pass over the surface of the water, but enters it, a regular flame is made upon the surface, consisting of ten or a dozen rays; and what is very remarkable, those rays which stretch towards the brass rod that communicates with the outside of the battery are always longer than the rest; and if the explosion is made at such a distance as to be very near taking the surface, those rays will be four or five times longer than the rest, and a line bounding the whole appearance will be an ellipse, one of whose foci is perpendicularly under the brass knob with which the discharge is made.

When an electrical battery is discharged upon smooth pieces of metal, the effects are very different from any of those we have yet mentioned. Dr Priestley having constructed some large batteries, determined to try what would be the effects of a very great electric power discharged upon metals and other substances; and, in the course of his random experiments, he made the following discoveries. "June 13, 1766 (says he,) after having discharged a battery of about 40 square feet with a smooth brass knob, I accidentally observed upon it a pretty large circular spot, the centre of which seemed to be superficially melted, in a great number of dots; larger near the centre, and smaller at a distance from it. Beyond this spot was a circle of black dust which was easily wiped off; but what I was most struck with, was, that after an interruption of melted places, there was an entire and exact circle of shining dots, consisting of places superficially melted like those at the
the centre. The appearance of the whole, exclusive of
of the black dust, is represented Plate CLXXVII.

I. June 14th, I took the spot upon smooth pieces of
lead and silver. It was in both cases like that on the
brass knob; only the central spot on the silver con-
fined of dots disposed with the utmost exactness, like
radii from the centre of a circle, each of which termi-
nated a little short of the external circle. I took the
circular spot upon polished pieces of several metals with
the charge of the same battery, and observed that the
cavities in some of them were deeper than in others; as
I thought in the following order, beginning with the
deepest, tin, lead, brass, gold, steel, iron, copper, sil-
ver. I will not be positive as to the order of some of
the metals, but silver was evidently not affected a fourth
part so much as gold, and much less than any of the
others. The circles were marked as plain, but the
impression was more superficial.

I also made the explosion between a piece of lead
just solid after melting, and another smooth piece that
I had kept a considerable time. The piece of fresh
lead was excited more than the other, but there was no
other difference between them. The led metal, as
bismuth and zinc, received the same impression as the
proper metals; being melted nearly as much as iron.
I made three discharges between a piece of highly
polished steel and a piece of very smooth iron, and in all
cases thought the steel was more deeply melted than
the iron.

Ficiently after I had observed the single circle, I
imagined, that, whatever was the cause of the appear-
ance, it was not improbable but that two or more con-
centric circles might be procured, if a greater quan-
tity of coated glasses was used, or perhaps if the explosion
was received upon metals that were more easily fused
than brass. Accordingly, June 27, taking the mod-
erate charge of a battery, consisting of about 38 square
feet, upon a piece of tin, I first observed a second outer
circle, at the same distance from the first, as the first
was from the central spot. It consisted of very fine
points hardly visible, except when held in an advan-
tageous light; but the appearance of the whole was
very beautiful, and was such as is represented Plate
CLXXVII. fig. 75. n° 2.

Having hitherto found the circles the most dif-
finet on metals that melt with the least degree of heat,
I soon after procured a piece of that composition which
melts in boiling water, and having charged 60 square
feet of coated glasses, I received the explosion with it,
and found three concentric circles; the outermost of
which was not quite so far from the next to it, as that
was from the innermost. All the space within the first
circle was melted: but the space was very well defined,
and by no means like a central spot, which in this case
was quite obliterated. The appearance of these three
concentric circles is represented Plate CLXXVII. fig.
75. n° 3. The distance at which the discharge was made
occasioned no difference in the diameter of these circular
spots. When, by putting a drop of water upon the
brass rod communicating with the inside of the bat-
tery, I made the discharge at the distance of two inches,
the spot was just the same as if it had been received at
the distance of half an inch, i. e. about a quarter of
an inch in diameter. Attempting to send an electric
shock over the surface of quicksilver or melted lead, I
found that it would not pass; though neither of the
rods with which the discharge was made touched the
metals. A dark impression was made on the surfaces
of both the quicksilver and the lead of the usual size
of the circular spot; and remained very visible not-
withstanding the state of fusion in which the metals
were."

§ 4. The electric Fluid moves through the Substances of
Electrics, though with difficulty. In most Cases, it passes
over the Surface of good Conductors.

This will appear from a consideration of the phe-
omena abovementioned, and some others. The elec-
tric most universally present is air. That the fluid
pervades its substance is evident to our eye-light; for
if a pointed body is placed on the prime conductor,
and at the same time the cylinder is briskly turned, a
continual stream of blue fire will be observed to issue
from the point. This is undoubtedly the fluid itself
made visible by the resistance it meets with from the
air. That the electric fluid in this case pervades the
air to a considerable distance, is also evident from the
different methods by which the air of a room may
be electrified. One method is that abovementioned: One
or more needles are fixed on the prime conductor,
which is kept strongly electrified for about 10 minutes.
If, afterwards, an electrometer is brought into the
room, the air will show that it has received a consider-
able quantity of electricity; for the balls will separate,
and continue to do even after the apparatus has been
quite removed out of the room. Another method of
electrifying the air is to charge a large jar and insulate
it; then connect a sharp-pointed wire, or a number of
them, with the knob of the jar; and make a communi-
cation from the outside coating to the table. If the
jar is charged positively, the air of the room will like-
wise soon become electrified positively; but if the jar is
charged negatively, the air will also become negative.
To this it may be replied, that the air is always full of
conducting substances, and that by means of them the
electricity is propagated from one part of the air to
another. But whether this is the case or not, it is
certain that the air, notwithstanding all the conducting
substances it may contain, is in fact an electric, and capa-
ble of receiving a charge like glass or any other elec-
tric substance. To this purpose there is a very curious
experiment made in the following manner. Take two
smooth boards, of a circular form, and each about three
or four feet in diameter. Coat one side of each with
tin-foil, which should be painted down and burned,
and turned over the edge of the board. These boards
must be both insulated, parallel to one another, in a
horizontal position. They must be turned with their
coated sides towards each other; and should be placed
in such a manner as to be easily moved to or from
each other; to do which, it will be proper to fix to
one of the boards a strong supporter of glass or baked
wood, and to suspend the other by silk strings from the
celling of the room; from which it may be lowered at
pleasure by means of a pulley. When these boards are
placed in the manner above described, and about an
inch distant from one another, they may be used exactly
as the coatings of a pane of glass. If a spark is given
from the conductor to the upper board, a spark will
in-
Theory.

infanfly be discharged from the lower one, if any conducting sub stance is presented to it. By continuing to give shocks to the upper board, and to take them from the lower one, the air between them will at last become charged like a piece of glass; and if a communication is made between them, they will explode, give the shock, &c. like glass.

In this experiment it seems impossible to deny that the air is penetrated by electric fluid. The distance of an inch is so small, that it must appear ridiculous to say that this space is penetrated only by a repulsive power, when in other cases we plainly see the fluid penetrating it to three or four times that distance. The flat surface of the boards indeed makes the motion of the electric fluid through the plate of air gradual and equal, so that it is not seen to pass in sparks or otherwise; but this is necessary to its receiving a charge, as will be afterwards explained.

If one electric substance is penetrable by the electric fluid, we must be led strongly to suspect at first, that all the rest are so too. That rosin, pitch, sealing-wax, &c. are so, hath already been proved; and from thence, if we reason analogically, we must conclude, that glass is likewise penetrable by it. A very strong additional proof of this is, that the electric shock cannot be sent over the surface of glass. If this substance was altogether impenetrable to the fluid, it is natural to think, that it would run over the surface of glass very easily. But instead of this, so great is its penetration to enter, that a shock sent through between two glass plates, if they are pressed pretty close together, always breaks them to pieces, and even reduces part of them to a powder like sand. This last effect cannot be attributed to any other cause than the electric fluid entering the pores of the glass; and, meeting with resistance, the impetus of its progressive motion violently forces the viscous particles asunder in all directions.

To this violent impetus of the electric fluid, when once it is set in motion, we may also add some probability to ascribe the burfting of electric globes, both such as are made of glass, and other materials, in the act of excitation. Dr Priestley hath given several instances of this accident. "The fragments (says he) have been thrown with great violence in every direction, so as to be very dangerous to the bystanders. This accident happened to Mr Sabbarelli in Italy, Mr Nollet in France, Mr Beraud at Lyons, Mr Boze at Wittemberg, Mr Le Cat at Rouen, and Mr Robein at Rennes. The air in the inside of Mr Sabbarelli’s globe had no communication with the external air, but that of the Abbe Nollet had. This last, which was of English flint glass, had been used for more than two years, and was above a line thick. It burft like a bomb in the hands of a servant who was rubbing it, and the fragments, none of which were above an inch in diameter, were thrown to a considerable distance. The Abbe says, that all the globes which were burft in that manner, exploded after five or six turns of the wheel; and he ascribes this effect to the action of the electric matter making the particles of glass vibrate in a manner he could not conceive.

"When Mr Berard’s globe burft (and he was the first to whom this accident was ever known to happen), he was making some experiments in the dark on the 8th of February 1750. A noise was first heard as of something rending to pieces; then followed the explosion; and when the lights were brought in, it was observed that those places of the floor which were opposite to the equatorial diameter of the globe were fire ed with smaller pieces, and in greater numbers, than those which were opposite to other parts of it. This globe had been cracked, but it had been in constant use in that place above a year; and the crack had extended itself from the pole quite to the equator. The proprietor ascribes the accident to the vibrations of the glass, and thought the crack had some way impeded these vibrations. When Mr Boze’s globe broke, he says that the whole of it appeared, in the act of breaking, like a flaming coal. Mr Boulanger says, that glass globes have sometimes burft like bombs, and have wounded many persons, and that their fragments have even penetrated several inches into a wall. He also says, that if globes burft in whirling by the gun barrel’s touching them, they burft with the same violence, the splinters often entering into the wall. The Abbe Nollet had a globe of sulphur which burft as he was rubbing it with his naked hands, after two or three turns of the wheel, having first cracked inwardly. It broke into very small pieces, which flew to a great distance, and into a fine dust; of which part flew against his naked breast, where it entered the skin so deep, that it could not be got off without the edge of a knife."
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Theory. have been supposed to be dissipated in the hard metals, yet we find this was not the case. Only a black spot was made on the surface, and the fluid was immediately dispersed, most probably over the surface of the metal.

It is not indeed easy to bring a decisive proof in favour of this hypothesis. The extreme futility, and, in most cases, invisibility, of the electric fluid, render all reasoning about its motions precarious. It is incredible, however, that this fluid should pass through the very substance of metallic bodies, and not be in the least retarded by their solid particles. In those cases, where the solid parts of metals are evidently penetrated, i.e. when wires are exploded, there is a very manifest reflection; for the parts of the wire are scattered about with violence in all directions. The like happened in Dr Priestley's circles made on smooth pieces of metal. Part of the metal was also dispersed and thrown off, for the circular spots were composed of little cavities. If therefore the fluid was dispersed throughout the substance; and not over the surface of the metal, it is plain, that a wire whose diameter was equal to one of those circular spots, ought also to have been destroyed by an explosion of equal strength sent through it. But this would not have been the case. A wire whose diameter is equal to one of those circular spots represented in fig. 75, Plate CLXXVII. would without injury conduct a shock much greater than any battery hitherto constructed could give. It is most probable therefore, that though violent flashes of electricity, which act also as fire, will enter into the substance of metals and consume them; yet it immediately disperses itself over their surface, without entering the substance any more, till being forced to collect itself into a narrow compass it again acts as fire.

In many cases, the electric fluid will be conducted very well by metals reduced to a mere surface, so that we can scarce say they have any thickness at all. A piece of white paper will not conduct a shock without being torn in pieces, as it is an electric substance. But a line drawn upon it with a black-lead pencil will easily convey the charge of several jars. It is impossible we can think that the fire here passes through the substance of the black-lead stroke. It must run over its surface; and if we consider some of the properties of metals, we shall find, that there is very great reason for believing that their conducting power lies at their surface.

The metals are, of all terrestrial substances, those which reflect the light most powerfully. Sir Isaac Newton hath shown that this reflective power they have not from their substance as metals, but from what he calls a repulsive power, spread equally over their surface. The existence of this repulsive power hath already been taken notice of in several instances, particularly in that of a chain, whose links cannot be brought into contact with each other without a considerable degree of force. It is exceedingly probable, that the repulsive power by which the links of the chain are kept asunder, and that by which the rays of light are reflected, are one and the same. As the electric fluid is known to pervade all substances, and metals as well as others, it seems also probable, that the repulsive and reflective power on the substance of metals is no other than the electric fluid itself in a quiescent state. Perhaps it may be thought absurd to ascribe the reflection of light to a substance of such extreme fluidity and tenuity as the electric fluid is; but we find that the vacuum of an air-pump, a medium of nearly equal tenuity with the electric fluid (as will elsewhere be proved), is in some cases capable of reflecting light very powerfully. Now it is certain, that nothing can be supposed to give such an easy passage to the electric fluid as itself; because it is the thinnest and most subtle of all the substances we know, and therefore must make the least resistance. Hence the fluid slides over the surface of a piece of metal with surprising ease; and when a large surface of metal is electrified, the effect is proportionate to the extent of it, because all that quantity of electric fluid which is spread over the surface, easily receives the motion communicated by the electrical machine.

The vacuum of an air-pump is found to be a very good conductor, and by means of it the motion of the fluid is rendered visible. Hence this is brought as an argument that the electric fluid always passes through the substance of conductors. That it doth so in some cases is indeed very evident, but it then meets with considerable resistance; and, even in the present instance, the passing through the vacuum of an air-pump, where it is opposed by a considerable quantity of the same kind of fluid, gives such a considerable resistance, that it will prefer a passage along a metallic rod to one through a vacuum. With regard to charcoal, and other conductors of that kind, as they are very porous, and likewise composed of fine spicules, it is probable the fluid may run along the surface of the spicule, and at the same time through the substance of the coal. Even in passing over the best conductors, however, this fluid meets with some resistance, as it will prefer a short passage through the air to a long one through the best conductors.

§ 5. The exceeding great Velocity and Strength of the Electric Fluid are not owing to a repulsive Power among its Particles; but to the mutual Action of the Air and Electric Fluid upon themselves and one another.

The arguments for a repulsive power existing between the particles of the electric fluid are very inconsiderate. Some of them have been already taken notice of. The strongest is that drawn from the appearance Electric of the electric fire issuing from a point, or from any fluid thrown body highly electrified. In the open air this diverges to be not excessively; and very often divides into several distinct rays, which by avoiding each other seem to be violently repulsive. That they are not so in reality, however, is plain from the appearance they have in vacuo; when, the resistance of the atmosphere being taken off, the electric light would have room to spread more widely. Fig. 27, Plate CLXXIV. represents an exhausted receiver with an electrified wire discharging a stream of this fluid from itself, by means of its communication with a machine. If the electric matter then was really elastic, or endowed with a power repulsive of itself, it is impossible it could pass in an uninterrupted column through an exhausted receiver as in the figure. A column of air, if blown swiftly through the orifice of a small pipe, will go forward a considerable way, if it is counterbalanced by air like itself on every side. But if such a column enters a vacuum, what
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Plate CLXXIV.

What we call its elasticity, occasions it to be dissipated in a moment, and equally dissipated through the whole exhausted receiver. But this by no means happens to the electric fluid; for even the small diversion represented in the figure seems entirely owing to some quantity of air left in the air-pump. Dr Watfon, by means of a long bent tube of glass filled with mercury, and inverted, made all the bended part which was above the mercury the most perfect vacuum that could be made. This vacuum he inflated; and one of the basons of mercury being made to communicate with the prime conductor, when some non-electric substance touched the other, the electric matter pervaded the vacuum in a continuance, and in such a situation that there was the more the eye could follow it, without the least divergency. From these experiments it appears, that there is in the vacuum of an air-pump, as well as in the Torricellian vacuum, a fluid of nearly the same density with the electric one: that the electric fluid is not repulsive of itself, but is repulsed by the atmosphere; and therefore all appearances of electric light are less bright in vacuo than in the open air; because, the more resistance the matter meets with, the brighter is the flash.

Thus, as long as a stream of electric fluid is moved through a medium of an equal density with itself, the equable pressure of the fluid all round will keep the luminous streams from diverging; but if the pressure is taken off from any part of the receiver, the pressure of the ret will immediately force the stream to that place, as represented fig. 28. That it is by a pressure of this kind, and not by any obscure atractive power, that this is occasioned, will be rendered very probable from the following example. Suppose a pot or kettle is boiling violently over a fire, and in such a situation that there is very little agitation in the surrounding air. The equal pressure of the atmosphere will then force the steam straight upwards in a cylindrical column; but if any object is brought near the edge of the pot, so that the pressure of the atmosphere is taken off on one side, the steam will be directly forced upon the body, or seemingly attracted by it. The electric matter therefore, being capable of having its motions resisted by the air, must immediately fly to that place where the ret is least; but in the case above mentioned, this is best done by applying a conducting substance to the side of a receiver, or one along which the fluid can run downward to the earth. This, however, will be more fully explained when we speak of the phenomena of the Leyden phial.

From this simple principle, viz. that fluids impelled by any force will always tend towards that place where there is the least resistance, most of the phenomena of electricity may be explained. The first thing to be considered is, from what source it originally derives the astonishing agility and strength displayed in its motions. If it is granted that the electric fluid is the same with the solar light, the ultimate cause of its momentum must be the power by which the light of the sun is emitted. As the power extends through regions of space which to our conceptions are truly infinite, so must the power itself be; and it is plain, that by this equable action all round, throughout the whole space thro' which the sun's light is propagated, the pressure of it upon all bodies must be equal all round, and consequently it can neither move them one way nor another. But if, by the intervention of some other power, the pressure is lessened upon any particular part, a current of electric matter will set towards that part, with a force exactly proportioned to the diminution of the pressure. Thus, in the common experiments of the air-pump, when the air is exhausted from a glass vessel, the pressure of the superincumbent atmosphere is directed towards every part of the glass; so that if it is of a flat square shape, and not very strong, it will certainly be broken. But after the air is exhausted, the vessel is discovered to be full of another subtle fluid of the same nature with the electric one. If this fluid could also be attracted from the vessel, the pressure on its sides would necessarily be much greater, because not only the atmosphere, but the whole surrounding ether or electric matter, would urge towards the place; and it is not probable, that the pressure could be resisted by any terrestrial power whatever. The momentum of the electric matter therefore, in our experiments, depends on two causes, viz. the pressure of the atmosphere upon the electric matter, and the pressure of one part of this matter upon another. The velocity with which it moves may be explained from its parts lying in contact with each other throughout the wide imminency of space. Hence the great tendency of the fluid to circulate; because, from whatever point a stream of it is sent off, there the pressure is lessened, and the stream, finding no place empty for its reception, must necessarily have a tendency to return to the place from whence it came, as there it meets with the least resistance; and hence, when a passage is opened for it, by which it can return to this point, it is urged thither with great violence, the equable pressure is restored, and the artificial motion ceases.

§ 6. The Matter in which an Electric Sub stance becomes excited, or diffuses its Electric Virtue.

This will easily appear from considering the means taken for the excitation of a common cylinder for electric experiments. The glass is a sub stance, as we have already seen, into which the electric matter is very apt to enter. To the surface of the glass is applied some amalgam spread on leather. This is a metallic substance which has an exceedingly great reflective power, being that which is employed for silverizing looking-glasses. The electric fluid therefore runs over its surface with great ease, and there is always a certain quantity of this fluid in a state of stagnation on its surface. At the place where the cylinder touches the amalgam, the air is excluded, and consequently the electric fluid hath there a tendency to rise more than at any other part of the surface where the atmosphere presses with its full force. When the cylinder begins to turn, it necessarily brings a small quantity of that electric matter which lay upon the surface of the amalgam. To understand this the more easily, we must consider that property which glasses of transmitting the electric fluid through it, and refusing it a passage along its surface. Thus we may conceive it to be formed of a vast number of exceedingly small tubes placed close to each other. If we suppose any substance made by art of such a texture, we would find it impossible to pour water along its surface, though it would very easily run through it. If such a substance

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was.
was made in the shape of a cylinder, and turned briskly round, with its surface just touching a quantity of water contained in a vessel, the consequence would be, that the water would be scattered round in all directions. The case seems to be the same with the more subtle electric fluid. The glass cylinder throws out part of the electric fluid lying on the surface of the amalgam. This quantity is perpetually renewed from the conducting side of the rubber. The quantity which is thrown out cannot be conducted over the surface of the glass, nor can it pass through it; because if it is resisted by the air in the inside, and, in some measure, by the glass itself. It is also resisted by the air on the outside; but as that resistance is less than what is made by the air and glass both put together, the fluid naturally forces itself into the open air. Still, however, there neither is nor can be, any accumulation of the matter itself. It cannot enter the air without displacing the electric matter which was there before. This will displace more of the same kind, and so on, till at last the motion is communicated to the electric matter lodged in some part of the earth. From thence it is propagated to the rubber of the electric machine, and thus a kind of circular motion is carried on. By the excitation of an electric substance, therefore, the fluid is not accumulated, but only set in motion. The reason of that seeming accumulation observable about the excited cylinder is, the resistance which the fluid meets with from the air. This instantly produces a divergency in the stream of electric matter, and a vibratory struggle betwixt it and the air; which again produces the appearances of fire and light, for the reasons already given.

That this kind of vibratory motion or struggle between the electric fluid and air always takes place when the latter is set in motion, seems evident from the sensation which is felt when a strongly excited electric is brought near any part of the human body. This is such as would be occasioned by a spider's web drawn lightly along the skin, or rather by a multitude of small insects crawling upon the body. It is, however, more clearly proved by an experiment made by Dr Priestley. He was desirous to know whether the electric fluid was concerned in the freezing of water or not. For this purpose he exposed two dishes of water to the open air in the time of a severe frost. One of them he kept quite strongly electrified; but could observe no difference in the time either when it began to freeze, which was in about three minutes, or in the thickness of the ice, when both had been frozen for some time. Happening to look out at the window through which he had put the dishes, he observed on each side of the electrified wire the same dancing vapour which is seen near the surface of the earth in a hot day, or at any time near a body strongly heated.

If the glass cylinder which we want to excite is exhausted of air, the electric matter, instead of lying off into the air, runs directly through the glass; and, meeting with some resistance from the vacuum as it is called, a weak light is produced in the inside, but no signs of electricity are perceived on the outside of the glass. The same thing happens by giving the cylinder or tube a metallic coating. The fluid collected from the rubber runs directly through the glass, and along the surface of the metallic coating, which keeps off the presence of the air contained in the glass. If an electric lining is used, and the glass is exhausted of air, the motion of the fluid becomes visible through both, and the whole is transparent, as already observed. If the cylinder is lined with an electric substance, and the air is not exhausted, the electricity on the outside is often considerably increased; but the reason of this is not evident. Most probably it is owing to the different kind of electricity acquired by the inside lining; for electricity of any kind always produces its opposite at a small distance, the reason of which shall be afterwards given.

If the air within the cylinder is condensed, the electrical appearances on the outside are lessened in proportion. The reason of this seems to be, that though it is necessary that the fluid should not go through the substance of the glass very easily, yet it is requisite that its passage should not be totally obstructed; and therefore the electric experiment succeeds best when the air within the glass is a little rarefied. We must also consider, that when an additional quantity of air is forced into the cylinder, an equal bulk of electric matter is forced out. The rest of the matter, therefore, which is contained all round the glass, presses violently into its pores; but this pressure is merely opposite to what happens when the glass is excited, must of consequence hinder the excitation. If the glass is now made very hot, the pressure of the atmosphere is kept off, and the passage of the electric fluid through the glass and condensed air is rendered easier, and therefore the electric appearances on the outside return.

On the same principles may we explain the excitation of a solid stick of glass, sealing-wax, or sulphur. Though these have no air within them, yet they have a very considerable quantity of electric matter, which renews an expulsion from its place; and therefore, tho' it may yield a little when the rubber is applied to the outside, yet it will instantly throw off into the atmosphere what the rubber has left on the surface; because the resistance is least towards that place, as soon as the electric has come out from under the rubber. Hence also we see the reason why no signs of electricity are observed on glass to which the rubber is immediately applied; namely, because the pressure being equally great all round, no part of the electric fluid can be thrown off into the atmosphere, in order to set the rest in motion.

The only thing necessary to be added in confirmation of this theory of excitation is, that electric substances of the same kind cannot be excited by rubbing them against one another. Thus glass cannot be excited by rubbing it against glass, &c. Mr Wlock observed, that when two pieces of glass were rubbed upon each other in the dark, a very vivid light appeared upon them; which, however, threw out no rays, but adhered to the place where it was excited. It was attended with a small phosphorescent smell, but no attraction or repulsion. From this experiment he inferred, that friction alone would not excite electricity; but that to produce this effect, the bodies rubbed together must be of different natures with respect to their attracting the electric fluid.
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§ 7. Of Positive and Negative Electricity.

From what hath been already advanced, it will pretty plainly appear, that to increase the quantity of electric fluid in any body is a thing impossible, unless we also augment the size of the body. All the fine pores of every terrestrial fluid are exceedingly full, and unless we separate the minutest particles of the body farther from one another than they are naturally, we cannot introduce more of the electric fluid into it than there was before. This fluid, we have already seen, is not, like the air, endowed with a repulsive force between its particles; and therefore it must be incomparable. If it is incomparable, all the phenomena attending it must be owing to its various motions, and the seeming accumulations of it must be owing only to its more brisk action in some places than in others. But before a complete solution of the phenomena of positive and negative electricity can be given, it is necessary to show that there are not so essentially distinct and opposite as all have been thought to be, but may be divided into two each other in such cases as we cannot possibly suppose either an addition or subtraction of the electric fluid.

This position, however opposite to the common opinions on the subject, may be proved by the following experiments. 1. Let a coated phial be set upon an insulating stand, and let its knob be touched by the knob of another phial negatively electrified. A small spark will be observed between them, and both sides of the electrified phial will instantly be electrified negatively. Now, though we may suppose the one side of the phial which is touched by the negatively electrified one to lose part of its fire, yet this cannot be the case with the other, because there is nothing to take it away, and therefore it ought to appear in its natural state. 2. Let a phial, having a pitch-ball electrometer fastened to its outside coating, be slightly charged positively, and then set upon an insulating stand. The outside is then negatively electrified, or, according to Dr Franklin's theory, has too little electric matter in it. The pitch-balls, however, will touch each other, or separate but in a very small degree; but let the knob of another bottle, which hath received a stronger charge of positive electricity, be brought near to the knob of the first, and the pitch-balls on the outside will diverge with positive electricity. Now, it is impossible that any substance can have both too much and too little electric matter at the same instant: yet we see that negative electricity may thus insensibly be converted into the positive kind, in circumstances where no addition of fire to the outside can be supposed. 3. Let the same phial, with the pitch-balls affixed to its outside coating, be slightly charged negatively, and then insulated. The outside is now electrified positively; or, according to Dr Franklin's hypothesis, has too great a quantity of electric fluid. Nevertheless, upon bringing the knob of a phial strongly electrified negatively to that of the insulated one, the pitch-balls will instantly diverge with negative electricity. 4. Let a phial receive as full a charge of positive electricity as it can contain, and then insulate it. Charge another very highly with negative electricity; bring the knob of the negative bottle near that of the positive one, and a thread will play briskly between them. But when the knobs touch each other, the thread after being attracted will be repelled by both. The negative electricity is somehow other superinduced upon the positive; and, for a few moments after the bottles are separated, both will seem to be electrified negatively. But if the finger is brought near the knob of that bottle on which the negative electricity was superinduced, it will instantly be dissipated, a small spark strikes the finger, and the bottle appears positively charged as before.

From these metamorphoses of positive into negative, or negative into positive, electricity, it seems proven in the most decisive manner, that positive electricity doth not consist in an accumulation, nor the negative kind in a deficiency, of the electric fluid. We are obliged, therefore, to adopt the only probable supposition, namely, that both of them arise entirely from the different directions into which the fluid is thrown in different circumstances; and of consequence, the only method of giving an intelligible explanation of positive and negative electricity is by considering the different direction of the fluid in each.

A great variety of methods have been contrived to ascertain the direction of the electric fluid, but all of them seem uncertain except that which is drawn from the appearance of electric light. The luminous matter appearing on a point negatively electrified is very small, resembling a globule; it makes little noise, and has a kind of hissing sound. The positive electricity, on the other hand, appears in a diverging luminous stream, which darts a considerable way into the air, with a cracking noise. Now, it is certain, that in whatever case the electric fluid darts from the point into the air, in that case it must be the most resisted by it; and this is evident in the positive electricity. In this, the rays evidently diverge from the points. We may, indeed, suppose them to be converging from many points in the surrounding air towards the metallic point. But why should we imagine that a visible ray would break out from one place of the atmosphere more than another? The air, we know, refists the motion of the electric fluid, and it certainly must resist it equally. Of consequence, when this fluid is coming from the air towards a pointed conductor, it must percolate slowly and invisibly through the air on all sides equally, till it comes so near that it is able to break through the intermediate space; and as this will likewise be equal, or nearly so, all round, the negative electricity must appear like a steady luminous globule on the point, not lengthening or shortening by flashes as the positive kind does. Electricians have therefore determined with a great deal of reason, that when a point is electrified positively the matter flows out from it.

It is to be remarked, however, that in most cases, if not in all, a body cannot be electrified negatively till it has first become positively electrified; and it is in the act of discharging its positive electricity that it becomes negative. Thus, suppose a coated phial to be set upon an insulated stand, and its knob is approached by that of another bottle charged positively; a small spark is observed between them, and both sides of the insulated bottle are electrified positively; but as soon as the finger is brought near to the outside, the positive electricity is discharged by a spark, and a negative one appears. But from what hath been already advanced, it
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It is evident, that positive electricity is when the fluid hath a tendency to leave any body, and the negative electricity when it hath the same tendency to enter it. Therefore, as the fluid in the conductor is subject to mechanical laws as well as other fluids, it must follow, that these tendencies are produced and kept up by the motions excited originally in the air, and electric fluid in the air, surrounding these bodies. If this principle is kept in view, it will lead us to an easy explanation of many electrical phenomena, for which no satisfactory reason hath hitherto been given.

§ 8. Of Electric Attraction and Repulsion.

It hath now been shown, that, in bodies electrified positively, there is a flux of electric matter from their surface all round; that is, the fluid contained in their pores pushes out on every side, and communicates a similar motion to the electric fluid contained in the adjacent atmosphere. This must of necessity very soon exhaust the body of its electric matter altogether, if it were not instantaneously supplied after every emission. But this supply is immediately procured from the surrounding atmosphere. The quantity sent off is instantly returned from the air, and the vibratory motion or struggle between the air and electric fluid, which hath been often mentioned, immediately takes place. The positive electricity therefore consists in a vibratory motion in the air and electric fluid; and the force of this vibration is directed outwards from the electrified body. In bodies negatively electrified, the fluid contained in the neighbouring atmosphere is directed towards the body to electrify. But it is certain, that this motion inwards cannot be continued unless there is also a motion of the fluid outwards from the body. In this case also there is a vibratory motion, but the force of it is directed inwards, and as the source of it lies not in the body, but in the surrounding atmosphere, it manifests itself somewhat less vigorously.

Therefor why these motions are continued for such a length of time as we see they are, is, the extreme mobility of the electric fluid. It doth not indeed appear from any experiments, that this fluid hath the least friction among its parts. A motion once induced into it must therefore continue for ever, until it is counteracted by some other motion of the same fluid. Hence, when a vibratory motion is once introduced among the particles of the electric fluid contained in any substance, that motion will be kept up by the surrounding fluid, let the body be removed to what place we please. There is no occasion indeed for supposing anything like an electric atmosphere round the electrified body. The case is exactly the same as with a burning body. Let a candle be carried to what place we will, it will still burn; but it would be absurd to say, that the fire surrounded it like an atmosphere, as we know the fire is kept up by the air only, which is changed every moment. In like manner, the positive and negative electricities, which are two different motions of the electric fluid, are kept up by the air and electric matter contained in it; and, wherever the electrified body is carried, these fluids are equally capable of continuing them.

The phenomena of attraction and repulsion are now easily explained. Let us suppose a body positively electrified suspended by a small thread, at a distance from any other. The vibration abovementioned, in which positive electricity consists, being kept up by the equable preasure on all sides, the body is neither moved to one side nor another. But when a negatively electrified body is brought near, the force of the vibration being directed outwards in the one, and inwards in the other, the preasure of the fluid in the intermediate space between them is greatly lessened; and of consequence the preasure on the other side drives them together, and they are said to attract each other. If another body, electrified also positively, is brought near to the first, the force of the vibrations are directly opposed to one another, and therefore the bodies recede from each other, and are said to repel one another.

The case is the same with two bodies negatively electrified: for there the electricity, as far as it extends round the bodies, consists of a vibratory motion of the electric fluid; and the vibrations being directed towards both the bodies, as towards two different centres, must necessarily cause them recede from each other; because, if they remained in contact, the vibratory motions would interfere with and destroy one another.

When a small body is brought within the sphere of another's electricity, the equable preasure of that vibratory or electrical sphere is somewhat lessened upon the side near which the second body is brought; and therefore it is immediately impelled towards the first by the action of the surrounding fluid, in order to keep up the equilibrium. As soon as it arrives there, the vibrations of the fluid around the first body being communicated to that within the pores of the second, it immediately acquires a sphere of electricity as well as the first, and is consequently repelled. The repulsion continues till the vibration ceases either by the action of the air, or by the body coming in contact with another much larger than itself; in which case the electricity is said to be discharged. If, after this discharge of electricity, the second body is still within the electric sphere of the first, it will immediately be attracted, and very soon after repelled, and so on alternately till the electricity of the former totally ceases.

§ 9. Of the Discharge of Electricity by Sparks upon blunt Conductors, and silently by pointed Ones.

The manner in which this is accomplished will best appear from considering the nature of what is commonly called electricity. This cannot appear but in an electric substance; and the substance in which it doth appear is the air. The prime conductor of an electrical machine discovers no other properties in itself, when electrified, than it had before. The metal is equally hard, shining, and impenetrable. The electricity, or properties of attracting, repelling, &c. are all lodged in the air; and if the conductor is placed in vacuo, they instantly cease. It had already been shown, that the electric matter runs over the surface of conducting substances in great quantities, like a stream of water running from one place to another. In this manner it will not pass over the surface of electrics. It enters their substance, and passes through it with a vibratory motion. This vibratory motion always shows a resistance; nor is it in any case possible to induce a vibration without first impressing a motion in one direction, and then refilling it by a contrary motion. Round
§10. Why Positive Electricity hath a Tendency to induce the Negative Kind on any Body kept within its Sphere of Action, and why Negative Electricity produces the Positive Kind in similar Circumstances.

This is one of the electrical phenomena most difficult to be solved; and indeed seems totally insoluble, unless we give up the idea of accumulation and deficiency of the electric fluid in different bodies. On Dr Franklin's principles, no solution hath been attempted. Mr Cavalo places this among the properties of electricity for which he doth not pretend to account, but gives as the causes of other phenomena. It is indeed certain, that if a body hath already too much electricity or any thing else, it cannot be continually taking from those around it; and if it hath too little, it cannot be continually giving them. By attending to the principles above laid down, however, this phenomenon admits of an easy solution. As positive electricity continues in a vibratory motion of the electric matter in the pores of any body, and to some distance through the air, while at the same time the force is directed outwards from the body, it is plain, that if any other body is brought within this sphere, the direction of the vibration is changed; for what is outwards from the one is inwards to the other. But a vibratory motion, the force of which is directed inwards, is what constitutes negative electricity; and therefore, no sooner is any body placed at some distance from one positively electrified, than it immediately becomes negatively so. The same reason may be given why negative electricity produces the positive kind on a body placed near it. In the negative kind, the force of the vibration is directed inwards. If another body is brought near, the vibration which is inwards to the first must be outwards from the second, which thus becomes positively electrified. The only difficulty here, is to account for this motion, which is only inward or outwards to one side of the body brought near the electrified one, being so suddenly propagated all round. This, however, must easily be seen to arise from the extreme fluidity of the electric fluid, and its effort to keep up an equilibrium in all parts, which it will never suffer to be broken. When this fluid pulses inward or outwards to one side of the body, the fluid contained in that body would immediately yield, and allow a free passage to what came after, if its yielding was not obstructed by something on the other side. This obstruction arises from the air, which cannot admit a progressive motion of electric matter through it. No sooner, therefore, is a push made against one side than a contrary one is made against the other; and thus the body instantly becomes electrified all round.

On these principles, also, may we account for the zones of positive and negative electricity which are to be found on the surface of glass tubes, and especially in electrified air. When the prime conductor of a machine is strongly electrified positively, it is throwing out the fluid from it in all directions. The air cannot receive this fluid without throwing out that which it also contains; and this shows, that simple electrification can neither increase nor diminish the density of the air, which is also vouched for by numerous experiments. But if the air throws out its electric fluid in all directions, it must throw part of it back upon the conduc-
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Theory. tor, and consequently obtains its operations. This likewife is found to be the case; for it is impossible to make an electric machine act long with the same degree or strength, owing to the electricity communicated from it to the air. But if the conductor and air are thus reciprocally throwing the electric matter back upon one another, it is impossible but another zone of air which lies at a greater distance must be continually receiving it, or be electrified negatively. But this cannot receive, without also emitting the fluid it contains; which, therefore, will be thrown upon another zone behind it, and partly back upon the preceding zone will be electrified; and the zone behind it, and partly back upon the preceding zone will be electrified negatively, though weaker than the former: and thus zones of electricity peculiar to each, and from this centre the vibrations on that side are destroyed; because the fluid phial becomes electrified negatively. Thus may we understand how a pane of glass or any other electric, may receive positive electricity on the one side and negative on the other, to as high a degree as we please. But there is found to be a limit to every degree of electricity we can give; and this limit is the resistance of the air. A phial will contain double the charge in air doubly condensed that it does in the common atmosphere; and when once the vibration becomes too great to be borne, the positive side of the glass throws out pencils of light, and will receive no more electricity in that state of the atmosphere.

Thus, in every charged phial, there is a violent impulse or vibration of the fluid, outward from the positive, and inward to the negative. As long as these continue, the phial continues charged. As the electric fluid seems to be subject to no other natural power, but controls all its own actions only by moving in opposite directions, it is plain, that if a charged phial is carefully kept from any of those means by which it is known to be discharged, it must keep its charge for a long time: and thus, by keeping phials within glass cases, their charge will be retained for six or eight weeks, or perhaps a great deal longer. The only method of discharging a phial, is by making a communication between the coatings. The fluid passing out of the positive side, now yields to the pressure of that from the negative side, and runs along the conductor. But no sooner does it come near the negative side of the phial, than, meeting with more of the same kind, the current of which is directed the same way, both together break through the air with a violent flash and crack, and all appearances of electricity cease.

In this, as in all other electrical experiments, it is easy to see, that the force, velocity, &c. of the fluid depends entirely on the pressure of that which surrounds us. Nature hath appointed a certain constitution or modification of the electric fluid in all terrestrial bodies, and likewise all round the earth. In our electrical experiments, we violate this constitution in some degree. When this violation is but small, the powers of nature operate gently in repairing the disorder we have introduced; but when any considerable deviation is occasioned, the natural powers restore the original constitution with extreme violence.

§ 11. Of the Leyden Phial.

The phenomena of the Leyden phial are easily explained from what hath been already advanced. Glasses and other electric substances are so constituted, that they can transmit the vibratory motions of the electric matter, though they cannot admit of any considerable progressive one. Conducting substances, on the other hand, admit of a progressive motion, but not so easily of a vibratory one. When the electric fluid is procured from the earth by an electric machine, if the conductor had a communication with the earth, all the matter collected by the cylinder would run along the conductor into the earth, and not a spark or other appearance of electricity would be procured in the air. But when the conductor is insulated, the matter is forced to go off into the air, and there produces the vibratory motions already mentioned. If a pane of glass which has no metallic coating touches the conductor, thought it is permeable by the vibratory motion of the fluid, yet a considerable resistance is made, and the fluid cannot easily diffuse itself over its surface. Nevertheless, it will soon show signs of having received electricity, that is, of having the fluid within its pores thrown into a vibratory motion. This motion is directed forwards, from the middle of the substance of the glass, to the surface, and a considerable way beyond it on both sides. Both sides of the glass are then positively electrified. If a conducting substance touches one of the sides of the glass, the vibrations on that side are destroyed; because the fluid phial being electrified, which occasioned them yields to the resistance met with, and runs along the conductor into the earth. But if no sooner is this done, than the power which refited the vibration outward from the glass having got the better in the manner just now explained, a new vibration is produced by that refisting power; and the force of this vibration is directed towards the side from whence the electricity is drawn off, which therefore becomes electrified negatively. Thus may we understand how a pane of glass or any other electric, may receive positive electricity on the one side and negative on the other, to as high a degree as we please.

But there is found to be a limit to every degree of electricity we can give; and this limit is the resistance of the air. A phial will contain double the charge in air doubly condensed that it does in the common atmosphere; and when once the vibration becomes too great to be borne, the positive side of the glass throws out pencils of light, and will receive no more electricity in that state of the atmosphere.

Thus, in every charged phial, there is a violent impulse or vibration of the fluid, outward from the positive, and inward to the negative side. As long as these continue, the phial continues charged. As the electric fluid seems to be subject to no other natural power, but controls all its own actions only by moving in opposite directions, it is plain, that if a charged phial is carefully kept from any of those means by which it is known to be discharged, it must keep its charge for a long time: and thus, by keeping phials within glass cases, their charge will be retained for six or eight weeks, or perhaps a great deal longer. The only method of discharging a phial, is by making a communication between the coatings. The fluid passing out of the positive side, now yields to the pressure of that from the negative side, and runs along the conductor. But no sooner does it come near the negative side of the phial, than, meeting with more of the same kind, the current of which is directed the same way, both together break through the air with a violent flash and crack, and all appearances of electricity cease.

In this, as in all other electrical experiments, it is easy to see, that the force, velocity, &c. of the fluid depends entirely on the pressure of that which surrounds us. Nature hath appointed a certain constitution or modification of the electric fluid in all terrestrial bodies, and likewise all round the earth. In our electrical experiments, we violate this constitution in some degree. When this violation is but small, the powers of nature operate gently in repairing the disorder we have introduced; but when any considerable deviation is occasioned, the natural powers restore the original constitution with extreme violence.

§ 12. The Phenomena of the Electrophorus accounted for.

The electrophorus is a machine represented Plate CLXXVII. fig. 73. It consists of two plates, A and B, usually of a circular form; though they may be made square, or of the figure of a parallelogram, with more ease, and with equal advantage. At first the under plate was...
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was of glass, covered over with sealing-wax; but there is little occasion for being particular either with regard to the substance of the lower plate, or the electric which is put upon it. A metallic plate, however, is perhaps preferable to a wooden one, though the latter will answer the purpose very well. This plate is to be covered with some electric substance. Pure sulphur answers very near as well as the dearer electrics, sealing-wax, gum-lac, &c.: but it hath this bad quality, that, by rubbing it, some exceeding subtle steams are produced, which infect the person's clothes, and even his whole body, with a very disagreeable smell, and will change silver in his pocket to a blackish colour. — The upper plate of the electrophorus is a brass plate, or a board or piece of pasteboard covered with tin-foil or gilt paper, nearly of the same size with the electric plate, though it will not be the worse that it is somewhat larger. It is furnished with a glass handle (I), which ought to be ferewed into the centre. The manner of using this machine is as follows. First, the plate B is excited by rubbing its coated side with a piece of new flannel, or a piece of hare's skin. Even a common hard shoe-brush, having the hair a little greased, will excite sulphur extremely well. When this plate is excited as much as possible, it is set upon the table with the electric side uppermost. Secondly, the metal plate is laid upon the excited electric, as represented in the figure. Thirdly, the metal plate is touched with the finger or any other conductor, which, on touching the plate, receives a spark from it. Lastly, the metal plate A, being held by the extremity of its glass handle (I), is separated from the electric plate; and, after it is elevated above that plate, it will be found strongly electrified with an electricity contrary to that of the electric plate; in which case, it will give a very strong spark to any conductor brought near it. By setting the metal upon the electric plate, touching it with the finger, and separating it successively, a great number of sparks may be obtained apparently of the same strength, and that without exciting again the electric plate. If these sparks are repeatedly given to the knob of a coated phial, it will presently become charged.

As to the continuance of the virtue of this electric plate (says Mr Cavallio), when once excited, without repeating the excitation, I think there is not the least foundation for believing it perpetual, as some gentlemen have supposed; it being nothing more than an excited electric, it must gradually lose its power by imparting continually some of its electricity to the air, or other substances contiguous to it. Indeed its electricity, although it could never be proved to be perpetual by experiments, lasts a very long time, it having been observed to be pretty strong several days, and even weeks, after excitation. The great duration of the electricity of this plate, I think, depends upon two causes; first, because it does not lose any electricity by the operation of putting the metal plate upon it, &c. and secondly, because of its flat figure, which exposes it to a less quantity of air, in comparison with a fickle of sealing-wax, or the like, which, being cylindrical, exposes its surface to a greater quantity of air, which is continually robbing the excited electrics of their virtue.

The first experiments that I made, relative to this machine, were with a view to discover which substance would answer best for costing the glass plate, in order to produce the greatest effect. I tried several substances either simple or mixed; and at last I observed, that the strongest in power, as well as the easiest, I could contrive, were those made with the second fort of sealing-wax, spread upon a thick plate of glass. A plate that I made after this manner, and no more than six inches in diameter, when once excited, could charge a coated phial several times successively, so strongly as to pierce a hole through a card with the discharge. Sometimes the metal plate, when separated from it, was so strongly electrified, that it darted strong flashes to the table upon which the electric plate was laid, and even into the air, besides causing the sensation of the spider's web upon the face brought near it, like an electric strongly excited. The power of some of my plates is so strong, that sometimes the electric plate adheres to the metal when this is lifted up, nor will they separate even if the metal plate is touched with the finger or other conductor. It is remarkable, that sometimes they will not act well at first, but they may be rendered very good by scraping with the edge of a knife the flinking or glossy surface of the wax. This seems analogous to the well-known property of glafs, which is, that new cylinders or globes, made for electric purposes, are often very bad electrics at first; but that they improve by being worked, i.e. by having their surface a little worn. Paper also has this property.

If, after having excited the sealing-wax, I lay the experiment with the wax upon the table, and the glass up-permost, i.e. contrary to the common method; then, on making the usual experiments of putting the metal plate on it, and taking the spark, &c. I observe it to be attended with the contrary electricity; that is, if I lay the metal plate upon the electric one, and, while in that situation, touch it with an insulated body, that body acquires the positive electricity; and the metallic removed from the electric plate, appears to be negative; whereas it would become positive, if laid upon the excited wax. This experiment, I find, answers in the same manner if an electric plate is used which has the sealing-wax coating on both sides, or one which has no glass plate.

If the brass plate, after being separated from, be presented with the edge toward the wax, lightly touching it, and thus be drawn over its surface, I find that the electricity of the metal is absorbed by the sealing-wax, and thus the electric plate looses part of its power; and if this operation is repeated five or six times, the electric plate looses its power entirely, so that a new excitation is necessary in order to revive it.

If, instead of laying the electric plate upon the table, it is placed upon an electric stand, so as to be accurately insulated, then the metal plate set on it acquires so little electricity, that it can only be discovered with an electrometer: which shows, that the electricity of this plate will not be conspicuous on one side of it, if the opposite side is not at liberty either to part with or acquire more of the electric fluid. In consequence of this experiment, and in order to ascertain how the opposite sides of the electric plate would be affected in different circumstances, I made the following experiments.

Upon an electric stand E (Plate CLXXVII. fig. 73.)
placed a circular tin-plate, nearly six inches in diameter, which by a slender wire communicated with an electroscope of pitch-balls, which was also insulated upon the electric stand. I then placed the excited electric plate of six inches and a quarter in diameter, upon the tin-plate, with the wax uppermost; and on removing my hand from it, the electroscope of tin-plate, immediately opened with negative electricity. If, by touching the electroscope, I took that electricity off, the electroscope did not afterwards diverge. But if now, or when the electroscope diverged, I presented my hand open, or any other uninsulated conductor, at the distance of about one or two inches, over the electric plate, without touching it, then the pitch-balls diverged; or, if they diverged before, came together, and immediately diverged again with positive electricity:—I removed the hand, and the balls came together; approached the hand, and they diverged: and so on.

If, while the pitch-balls diverged with negative electricity, I laid the metal plate, holding it by the extremity of its glass handle, upon the wax, the balls came, for a little time, towards one another, but soon opened again with the fame, i.e., negative electricity.

If, whilst the metallic plate rested upon the electric plate, I touched the former, the electroscope immediately diverged with positive electricity; which if, by touching the electroscope, I took off, the electroscope continued without divergence.—I touched the metal plate again, and the electroscope opened again; and so on for a considerable number of times, until the metal plate had acquired its full charge. On taking now the metal plate up, the electroscope instantly diverged with strong negative electricity.

I repeated the above-described experiments, with this only difference in the disposition of the apparatus, i.e., I laid the electric plate upon the excited sealing-wax upon the circular tin-plate, and the glass uppermost; and the difference in their result was, that where the electricity had been positive in the former disposition of the apparatus, it now became negative, and vice versa; except that, when I first laid the electric plate upon the tin, the electroscope diverged with negative electricity, as well in this as in the other disposition of the apparatus.

I repeated all the above experiments with an electric plate, which, besides the sealing-wax coating on one side, had a strong coat of varnish on the other side, and their result was similar to that of those made with the above-described plate.

This is Mr. Cavallo's account of the electrophorus; but there is one part of it in which he must certainly be mistaken. He tells us, that, if instead of laying the electric plate upon the table, it is set upon an electric stand, so as to be accurately insulated, then the metal plate set on it acquires so little electricity, that it can only be discovered by an electroscope. In what manner this gentleman came to mistake a plain fact so egregiously, is not easy to determine; but it is certain, than an electrophorus, instead of having its virtue impaired by being insulated, has its greatly increased, at least the sphere of its activity is greatly enlarged. When lying on the table, if the upper plate be put upon it without being touched with the finger, it will not show much sign of electricity. But as soon as it is put on the electric stand, both the upper and under side appear strongly negative. A thread will be attracted at the distance of eight or ten inches. If both the upper and under side are touched at the same time, a strong spark will be obtained from both, but always of the same kind of electricity, namely, the negative kind. If the upper plate is now lifted up, a strong spark of positive electricity will be obtained from it; and on putting it down again, two sparks of negative electricity will be produced.

The singularity of this experiment is, that it produces always double the quantity of negative electricity that it does of the positive kind; which cannot be done by any other method yet known. Another very surprising circumstance is, that when the electrophorus remains in its insulated situation, you need not always touch the upper and under side of the plates at once, in order to procure positive electricity from the upper plate: It is sufficient to touch both sides only once. On lifting up the upper plate, a spark of positive electricity is obtained as already mentioned. On putting it down again, a spark of the negative kind is obtained from the upper plate, even though you do not touch the lower one. On lifting up the upper plate, a spark of positive electricity is obtained, but weaker than it would have been had both sides been touched at once. Putting down the upper plate again without touching both, a still weaker spark first of negative and then of positive electricity will be obtained from the upper one. Thus the sparks will go on continually diminishing, to the number perhaps of two or three hundred. But at last, when the electricity of the whole machine seems to be totally lost, if both sides are touched at once, it will instantly be refired to its full strength, and the double spark of negative, with the single one of positive electricity, will be obtained without intermission as before.

To account for all these phenomena very particularly, General Lyly, is perhaps impossible, without a greater degree of reason of knowledge concerning the internal fabric of bodies than we have access to attain. In general, however, it is evident, that the phenomena of the electrophorus arise from the disposition that the electric matter hath to keep up an equilibrium within itself throughout every part of the universe. In consequence of this, no motion of the electric matter can be produced upon the one side of a body, but it must immediately be balanced by a corresponding one on the opposite side; and in proportion to the strength of the one, so will the strength of the other be. When the under plate of the electrophorus is excited, the negative electricity or vibratory action of the electric matter towards the excited side, is produced; and the moment that such an action is produced on one side, it is resisted by a similar one on the opposite side, and thus the electrophorus becomes negatively electrified on both sides. As long as the under part of the machine communicates with the earth, the vibratory motion is impeded by the progressive one towards the earth. This makes the reluctance on the under side less, and therefore the vibratory motion on the upper part extends but a small way. When the plate is insulated, the electric matter has not an opportunity of escaping to the earth as before, because it is strongly refired by the air; a vibration
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Bibration therefore takes place on both sides, and extends to a great distance from the plate. When the upper plate is set upon the electrophorus, the same kind of electricity, viz. the negative kind, is communicated to it. When both sides are touched with the finger, or with any other conducting substance, both electrics are suddenly taken off, because the electric matter running along the conducting substance on both sides, puts an end to the vibratory motion in the air, which constitutes the very essence of what we call electricity. There is now a quiet and equal balance of the electric matter on both sides, and therefore no signs of electricity are shown. But as soon as the upper plate is taken off, this balance is destroyed. The fluid in the metal plate had not been able to penetrate the electric substance in such a manner as to put a stop to the vibrations of what was within it. As soon then as the plate is taken off, the electricity or vibratory motion towards the electric breaks out at that side. But this motion inwards to the electric, which constitutes negative electricity, necessarily becomes outward from the plate; and as no motion of the fluid can be produced on one side of a body, but what is immediately communicated to the other, the upper plate becomes electrified positively, and the under one negatively on both sides.

Sect. VII. Of the Method of using the Electrical Apparatus already described, with some practical Rules for performing Experiments with it to the best Advantage.

The machines already described are calculated for exhibiting the phenomena of electricity in a very high degree; and in general the following effects may be expected from them.

1. On whirling the cylinder in contact with the rubber, without bringing any conducting body near the former, or insulating the latter, we will perceive in the dark a stream of fire seemingly issuing from the place of contact between the rubber and cylinder, and adapting itself to the form of the cylinder so as to involve it in a blue flame mixed with bright sparks; the whole making a very perceptible whizzing and snapping noise. If the finger is brought near the cylinder in this situation, the flame and sparks will leave the cylinder and strike it; and this phenomenon will continue as long as the globe is whirled round.

2. On applying the prime conductor, the light will in a great measure vanish, and be perceptible only upon the points presented by it to the cylinder: but if the finger is now brought near the conductor, a very smart spark will strike it, and that at a greater or smaller distance according to the strength of the machine. This spark, when the electricity is not very strong, appears like a straight line of fire; but if the machine acts very powerfully, it will put on the appearance of zigzag lightning, throwing out other sparks from the corners, and strike with such force as to give considerable pain to those who receive it. These sparks in Method of certain circumstances will set fire to spirits, tinder, using the gunpowder, &c.

3. If instead of the hand or any part of the human body, we hold the knob of a coated plate near the conductor, a vast number of sparks will appear between them, first with a loud snapping noise, but gradually diminishing until at last it ceases, and pencils of blue flame intermixed with small sparks will be thrown out by the phial; and if the latter is still kept near the conductor, it will in a little time discharge itself with a violent flash and crack; after which, if the phial has not been broke by the discharge, the sparks from the conductor will begin as before, and the same phenomena be repeated as long as the cylinder is turned, or til the phial breaks.

4. On applying the battery, though the accumulation of electricity be much greater than in a single phial, the signs of it are much less apparent; and sparks will always pass between the conductor and knob leading to the battery, by reason of the great evaporation from the latter into the air. But here, if one of the jars discharges itself, all the rest are likewise discharged in the same moment, and some of them generally broken.

5. A thread or other light body suspended near the conductor will be attracted at a considerable distance, and the force of attraction will be greater or less according to the power of the machine.

6. The electricity in all cases will be positive if the rubber be not insulated, and negative if it is so: and by Mr. Nairne's contrivance of having a conductor connected with the insulated rubber, and another with the cylinder, both kinds of electricity may be had with equal ease.

All these phenomena are the more remarkable in Eisleah of proportion to the power of the machine. That used the great in Teyler's museum is the strongest of which we have at present yet heard; and its effects are as follow.

On presenting a very sharp steel point to the prime conductor, a luminous stream of about half an inch was perceived between them. On fixing the point to the conductor, so as to project three inches from it, streams of light were thrown out from the point fix inches long when a ball of three inches in diameter was presented, but only two inches in length on presenting another point.

The sensation called the spider's web on the face of the bystanders (a) is often felt at the distance of eight feet from the prime conductor. A thread six feet long was sensibly attracted at the distance of 30 feet from the prime conductor, and a pointed wire appeared luminous at the distance of 28 feet; a cork-ball electrometer diverged at the distance of 40 feet.

A single spark from the conductor melted a considerable length of gold-leaf; gunpowder and other combustibles, inclosed in a paper cartridge, with a sharp point in the middle, were fired; and when another conductor communicating with the earth was placed at the distance of 21, or sometimes 24 inches

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(a) This is a kind of sensation always produced by strong electricity, sometimes resembling the creeping of insects or the motion of a light body, such as a spider's web, over the skin, as already mentioned. It seems to proceed from the attraction and electrification of the small hairs with which the body is covered.
from the prime conductor of the machine, a stream of fire was perceived between them. This was crooked, and darting out many lateral brushes of a very large size, in the manner already mentioned. A Leyden phial, containing about one square foot of coated surface, was fully charged by about half a turn of the winch so as to discharge itself; and by repeated trials it was found, that in one minute it discharged itself 76, 78, and frequently 80 times. Lastly, it was found, that though the conductor, which received the sparks from the prime one of the machine, communicated with the earth by a wire 4/6 of an inch in diameter, this wire would give small sparks to any conducting body brought near it, as if even this wire had not been sufficient to conduct the quantity of electricity it received from the machine very readily to the earth.

Though these effects are not to be expected from our ordinary electrical machines, yet it is certain, that by taking proper care of them they will be found to act much more powerfully than if neglected. The following directions therefore will be found useful for such as wish to make electrical experiments.

1. The first thing to be observed, is, the preservation and care of the instruments. The electrical machine, the coated jars, and in short every part of the electrical apparatus, should be kept clean, and as free as possible from dust and moisture.

2. When the weather is clear, and the air dry, especially in clear and frosty weather, the electrical machine will always work well. But when the weather is very hot, the electrical machine is not so powerful; nor in damp weather, except it be brought into a warm room, and the cylinder, the flasks, the jars, &c. be made thoroughly dry.

3. Before the machine be used, the cylinder should be first wiped very clean with a soft linen cloth that is dry, clean, and warm; and afterwards with a clean hot flannel, or an old silk handkerchief: this done, if the winch be turned from the prime conductor and other instruments are removed from the electrical machine, and the knuckle be held at a little distance from the surface of the cylinder, it will be soon perceived, that the electrical fluid comes like a wind from the cylinder to the knuckle; and, if the motion be a little continued, sparks and cracking will soon follow. This indicates that the machine is in good order, and the electrician may proceed to perform his experiments. But if, when the winch is turned for some time, no wind is felt upon the knuckle, then the fault is, very likely, in the rubber: and to remedy that, use the following directions: By loosening the screws on the back of the rubber, remove it from its glass pillar, and keep it a little near the fire, so that its flax part may be dried; take now a dry piece of mutton felt, or a little tallow from a candle, and just pass it over the leather of the rubber; then spread a small quantity of the above described amalgam over it, and force it as much as possible into the leather. This done, replace the rubber upon the glass pillar; let the glass cylinder be wiped once more, and then the machine is fit for use.

4. Sometimes the machine will not work well because the rubber is not sufficiently supplied with electric fluid; which happens when the table, upon which the machine stands, and to which the chain of the rubber is connected, is very dry, and consequently in a bad conducting state. Even the floor and the walls of the room are, in very dry weather, bad conductors, and they cannot supply the rubber sufficiently. In this case the best expedient is, to connect the chain of the rubber, by means of a long wire, with some moist ground, a piece of water, or with the iron work of a water-pump; by which means the rubber will be supplied with as much electric fluid as is required.

5. When a sufficient quantity of amalgam has been accumulated upon the leather of the rubber, and the machine does not work very well, then, instead of putting on more amalgam, it will be sufficient to take the rubber off, and to scrape a little that which is already upon the leather.

6. It will be often observed, that the cylinder, after being used for some time, contracts some black spots, occasioned by the amalgam, or some foulness of the rubber, which grow continually larger, and greatly obstruct its electric power. These spots must be carefully taken off, and the cylinder must be frequently wiped in order to prevent its contracting them.

7. In charging electric jars in general, it must be observed, that not every machine will charge them equally high. That machine whose electric power is the strongest, will always charge the jars highest. If the coated jars, before they are used, be made a little warm, they will receive and hold the charge better.

8. If several jars are connected together, among which there is one that is apt to discharge itself very soon, then the other jars will soon be discharged with that; although they may be capable of holding a very great charge by themselves. When electric jars are to be discharged, the electrician must be cautious, lest by some circumstance not adverted to, the shock should pass through any part of his body; for an unexpected shock, though not very strong, may occasion several disagreeable accidents. In making the discharge, care must be taken that the discharging rod be not placed on the thinnest part of the glass, for that may cause the breaking of the jar.

9. When large batteries are discharged, jars will be often found broken in it, which burst at the time of the discharge. To remedy this inconvenience, Mr. Nairne says, he has found a very effectual method, which is, never to discharge the battery through a good conductor, except the circuit be at least five feet long. Mr. Nairne says, that ever since he made use of this precaution, he has discharged a large battery near a hundred times without ever breaking a single jar, whereas before he was continually breaking them. But here it must be considered, that the length of the circuit weakens the force of the shock proportionally; the highest degree of which is in many experiments required.

10. It is advisable, when a jar, and especially a battery, has been discharged, not to touch its wires with the hand, before the discharging rod be applied to its sides a second and even a third time; as there generally remains a residuum of the charge, which is sometimes very considerable.

11. When any experiment is to be performed which requires but a small part of the apparatus, the remaining part of it should be placed at a distance from the machine.
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Section VIII.

Entertaining Experiments.

I. The Electrified Cork-ball Electrometer.

Fix at the end of the prime conductor a knobbed rod, and hang on it two small cork-balls suspended by threads of equal length. The balls will now touch one another, the threads hanging perpendicularly, and parallel to each other. But if the cylinder of the machine be whirled by turning the winch, then the cork-balls will repel one another; and more or less according as the electricity is more or less powerful.

If the electrometer be hung to a prime conductor negatively electrified, i.e., connected with the insulated rubber of the machine, the cork-balls will also repel each other. If, in this state of repulsion, the prime conductor is touched with some conducting substance not insulated, the cork-balls will immediately come together. But if, instead of the conducting substance, the prime conductor is touched with an electric, as for instance a stick of sealing-wax, a piece of glass, &c.; then the cork-balls will continue to repel each other; because the electric fluid cannot be conducted through that electric; hence we have an easy method of determining what bodies are conductors and what electricies. This electrical repulsion is also shown by a large downy feather, or still more agreeably by the repulsion of a human head with hair, as shown fig. 47. for there the electric repulsion will make the hair erect itself in a strange manner. If the feather is used, it will appear beautifully swelled by the divergence of its down.

II. Attractions and Repulsions of Light Bodies.

Connect with the prime conductor, by means of the hook $H$, the two parallel brass plates $F, G$, as represented in fig. 38. at about three inches distance from one another; and upon the lower plate put any kind of light bodies, as bran, bits of paper, bits of leaf-gold, &c.; then work the machine, and the light bodies will soon move between the two plates, leaping alternately from one to the other with great velocity. If, instead of bran or irregular pieces of other matter, small figures of men or other things cut in paper and painted, or rather made of the pith of alder, be put upon the plate, they will generally move in an erect position, but will sometimes leap one upon another, or exhibit different postures, fo as to afford a pleasing spectacle to an observing company. When bran or other substances of that kind are made use of, it will be proper to incline both plates in a glass cylinder, by which the bran will be kept from dispersing and flying about the room.

The phenomena of electric attraction and repulsion may be represented also with a glass tube, or a charged bottle, and some of them in a manner more satisfactory than with the machine.

III. The Flying-feather, or Shuttle-cock.

Take a glass tube (whether smooth or rough is not material); and after having rubbed it, let a small light feather be let out of your fingers at the distance of Entertainment about eight or nine inches from it. This feather will immediately be attracted by the tube, and will flick very close to its surface for about two or three seconds, and sometimes longer; after which time it will be repelled; and if the tube be kept under it, the feather will continue floating in the air at a considerable distance from the tube, without coming near it again, except it first touches some conducting substance; and if you manage the tube dexterously, you may drive the feather through the air of a room at pleasure.

There is a remarkable circumstance attending this experiment; which is, that if the feather be kept at a distance from the tube by the force of electric repulsion, it always presents the same part towards the tube;—you may move the excited tube about the feather very swiftly, and yet the same side of the feather will always be presented to the tube.

This experiment may be agreeably varied in the following manner: A person may hold in his hand an excited tube of smooth glass, and another person may hold an excited rough glass tube, a stick of sealing-wax, or in short another electric negatively electrified, at about one foot and a half distance from the smooth glass tube; a feather may be let go between these two differently excited-electricies, and it will leap alternately from one electric to the other; and the two persons will seem to drive a shuttle-cock from one to the other by the force of electricity.

IV. The Electric Well.

Place upon an electric fluid a metal quart mug, or some other conducting body nearly of the same form and dimension; then tie a short cork-ball electrometer, at the end of a silk thread proceeding from the ceiling of the room, or from any other support, so that the electrometer may be suspended within the mug, and no part of it may be above the mouth; this done, electrify the mug by giving it a spark with an excited electric or otherwise; and you will see that the electrometer, whilst it remains in that inflated situation, even if it be made to touch the sides of the mug, is not attracted by it, nor does it acquire any electricity; but if, whilst it stands suspended within the mug, a conductor, standing out of the mug, be made to communicate with or only presented to it, then the electrometer is immediately attracted by the mug.

The following experiment require to be made in the dark: for although the electric light in several circumstances may be seen in the day-light, yet its appearance in this manner is very confused; and that the electrician may form a better idea of its different appearances, it is absolutely necessary to perform such experiments in a darkened room.

V. The Star and Pencil of Electric Light.

When the electrical machine is in good order, and the prime conductor is situated with the collector sufficiently near the glass cylinder, turn the winch, and you will see a lucid star at each of the points of the collector. This star is the constant appearance of the electric fluid that is entering a point. At the same time you will see a strong light proceeding from the rubber,
rubber, and spreading itself over the surface of the cylinder; and if the excitation of the cylinder is very powerful, dense streams of fire will proceed from the rubber, and darting round almost half the circumference of the cylinder, will reach the points of the collector. If the prime conductor is removed, the dense streams of fire will go quite round the cylinder; reaching from one side of the rubber to the other. If the chain of the rubber is taken off, and a pointed body, as for instance the point of a needle or pin is, presented to the back of the rubber, at the distance of about two inches, a lucid pencil of rays will appear to proceed from the point presented, and diverge towards the rubber. If another pointed body be presented to the prime conductor, it will appear illuminated with a star; but if a pointed wire or other pointed conducting body be connected with the prime conductor, it will throw out a pencil of rays.

VI. Drawing Sparks.

Let the prime conductor be situated in its proper place, and electrify it by working the machine; then bring a metallic rod with a round knob at each end, or the knuckle of a finger, within a proper distance of the prime conductor, and a spark will be seen between that and the knuckle or knobbed wire. The longer and stronger spark is drawn from that end of the prime conductor which is farthest from the cylinder, or rather from the extremity of the knobbed rod fixed at its end; for the electric fluid seems to acquire an impetus by going through a long conductor, when electrified by a powerful machine. This spark appears like a long line of fire, reaching from the conductor, to the opposed body, and often (particularly when the spark is long, and different conducting substances are near the line of its direction) it will have the appearance of being bended to sharp angles in different places, exactly resembling a flash of lightning. It often darts brushes of light sidewise in every direction.

VII. The Electric Light flashes between two Metallic Plates.

Let two persons, one standing upon an insulated stool, and communicating with the prime conductor, and another standing upon the floor, each hold in one of his hands a metal plate, in such a manner that the plates may stand back to back in a parallel situation, and about two inches asunder. Let the winch of the machine be turned, and you will see the flashes of light between the two plates go dense and frequent, that you may easily distinguish any thing in the room. By this experiment the electric light is exhibited in a very copious and beautiful manner, and it bears a striking resemblance to lightning.

VIII. To fire Inflammable Spirits.

The power of the electric spark to set fire to inflammable spirits, may be exhibited by several different methods, but more easily thus: Hang to the prime conductor a short rod having a small knob at its end; then pour some spirits of wine, a little warmed, into a spoon of metal; hold the spoon by the handle, and place it in such a manner, that the small knob on the rod may be about one inch above the surface of the spirits. In this situation, if, by turning the winch, a spark be made to come from the knob, it will set the spirits on fire. It will generally be found more advantageous to fix the dish containing the spirits upon the prime conductor, as represented fig. 48.

This experiment may be varied different ways, and may be rendered very agreeable to a company of spectators. A person, for instance, standing upon an electric stool, and communicating with the prime conductor, may hold the spoon with the spirits in his hand, and another person, standing upon the floor, may set the spirits on fire by bringing his finger within a small distance of it. Instead of his finger, he may fire the spirits with a piece of ice, when the experiment will seem much more surprising. If the spoon is held by the person standing upon the floor, and the inflamed person brings some conducting substance over the surface of the spirits, the experiment succeeds as well.

IX. The Artificial Bolognian Stone illuminated by the Electric Light.

The most curious experiment to show the penetrability of the electric light, is made with the real, or more easily with the artificial, Bolognian stone invented by the late Mr J. Canton. This phosphorus is a calcareous substance, generally used in the form of a powder, which has the property of absorbing light when exposed to it, and afterwards appearing lucid when brought into the dark. Take some of this powder, and by means of spirits of wine or ether, flick it all over the inside of a clear glass phial, and stop it with a glass stopper, or a cork and sealing-wax. If this phial be kept in a darkened room (which for this experiment must be very dark), it will give no light; but let two or three strong sparks be drawn from the prime conductor, when the phial is kept at about two inches distance from the spark, so that it may be exposed to that light, and this phial will receive that light, and afterwards will appear illuminated for a considerable time. The powder may be stuck upon a board by means of the white of an egg, so as to represent figures of planets, letters, or any thing else at the pleasure of the operator; and the figures may be illuminated in the dark, in the same manner as the above described phial.

A beautiful method to express geometrical figures with the above phosphorus, is to bend small glass tubes of about the tenth part of an inch diameter, in the shape and figure desired, and then fill them with the phosphorus powder. These may be illuminated in the manner described, and they are not so subject to be spoiled as the figures represented upon the board frequently are. The best method of illuminating this phosphorus, and which Mr W. Canton generally used, is to discharge a small electric jar near it.

X. The Luminous Conductor.

Fig. 24, represents a prime conductor invented by Mr Henley, which shows clearly the direction of the electric fluid passing through it, from whence it is called the luminous conductor. The middle part EF of this conductor is a glass tube about 18 inches long and three or four inches in diameter. To both ends of this tube the hollow brass pieces FD, BE, are cemented air-tight, one of which has a point G, by
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**Electricity.**

Take a phial nearly of the shape and size of a Florence flask; fix a stop-cock or a valve to its neck, and exhaust it of air as much as possible with a good air-pump. If this glass is rubbed in the common manner fig. 21, it will not excite electrics; it will appear luminous within, being full of a flashing light, which plainly resembles the aurora borealis or northern light. This phial may also be made luminous, by holding it by either end, and bringing the other end to the prime conductor; in this case, all the cavity of the glass will instantly appear full of flashing light, which remains in it for a considerable time after it has been removed from the prime conductor. Instead of the above-described glass vessel, a glass tube exhausted of air and hermetically sealed may be used, and perhaps with better advantage. The most remarkable circumstance of this experiment is, that if the phial, or vessel, after it has been removed from the prime conductor (and even several hours after its flashing light hath ceased to appear), be grasped with the hand, strong flashes of light will immediately appear within the glass, which often reach from one of its ends to the other.

XII. The Aurora Borealis.

Take a phial nearly of the shape and size of a Florence flask; fix a stop-cock or a valve to its neck, and exhaust it of air as much as possible with a good air-pump. If this glass is rubbed in the common manner fig. 21, it will not excite electrics; it will appear luminous within, being full of a flashing light, which plainly resembles the aurora borealis or northern light. This phial may also be made luminous, by holding it by either end, and bringing the other end to the prime conductor; in this case, all the cavity of the glass will instantly appear full of flashing light, which remains in it for a considerable time after it has been removed from the prime conductor. Instead of the above-described glass vessel, a glass tube exhausted of air and hermetically sealed may be used, and perhaps with better advantage. The most remarkable circumstance of this experiment is, that if the phial, or vessel, after it has been removed from the prime conductor (and even several hours after its flashing light hath ceased to appear), be grasped with the hand, strong flashes of light will immediately appear within the glass, which often reach from one of its ends to the other.

XIII. The Visible Electric Atmosphere.

C I, fig. 25, represents the receiver with the plate Plate of an air-pump. In the middle of the plate I E, a short rod is fixed, having at its top a metal ball B nicely polished, whose diameter is nearly two inches. From the top of the receiver, another rod AD, with a like ball A, proceeds, and is cemented air-tight in the neck C; the distance of the balls from one another being about four inches, or rather more. If, when the receiver is exhausted of air, the ball A be electrified positively, by touching the top D of the rod AD with the prime conductor, or an excited glafs tube, a lucid atmosphere appears about it, which although it consists of a feeble light, is yet very conspicuous, and very well defined; at the same time, the ball B has not the least light. This atmosphere does not exist all round the ball A; but reaches from about the middle of it, to a small distance beyond that side of its surface which is towards the opposite ball B. If the rod with the ball A be electrified negatively, then a lucid atmosphere, like the above described, will appear upon the ball B, reaching from its middle to a small distance beyond that side of it that is towards the ball A; at the same time the negatively electrified ball A remains without any light. The operator in this experiment must be careful not to electrify the ball A too much; for then the electric fluid will pass in a spark from one ball to the other, and the experiment will not have the desired effect. A little practice, however, will render the operation very easy and familiar.

XIV. Of charging and discharging a Phial in general.

Make a coated jar, and place it upon the table near Plate the prime conductor, so that the knob of its wire, and clxxiv, that only, may be in contact with it; fix the quadrant electrometer fig. 15, upon the prime conductor, and then turn the winch of the machine. You will observe, that as the jar is charging, the index of the electrometer
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Plate Fig. 22. 23. represent a small phial coated on the outside, about three inches up the sides, with tin-foil; at the top of the neck of this phial, a brass cap is cemented, having a hole with a valve, and from the cap a wire proceeds a few inches within the phial, terminating in a blunt point. When this phial is exhausted of air, a brass ball is screwed upon the brass cap, which is cemented into its neck, so as to defend the valve, and prevent any air from getting into the exhausted glass. This phial exhibits clearly the direction of the electric fluid, both in charging and discharging; for if it be held by its bottom, and its brass knob be presented to the prime conductor positively electrified, you will see that the electric fluid caueth the pencil of rays to proceed from the wire within the phial, as represented fig. 22.; and if it be discharged, a star will appear in the place of the pencil, as represented in fig. 23. But if the phial be held by the brass cap, and its bottom be touched with the prime conductor, then the point of the wire on its inside will appear illuminated with a star when charging, and with a pencil when discharging. If it be presented to a prime conductor electrified negatively, all these appearances, both in charging and discharging, will be reversed.

The apparatus represented fig. 25. will be found very convenient for the various experiments upon the luminous conductor, Leyden vacuum, jars charged positively or negatively, with their different plates of insolation. A is an illuminating pillar of glass, which is fixed to the wooden foot B; and on this pillar all the apparatus may be screwed alternately. CD is an exhausted tube of glass, furnished at each end with brass caps; at the end D is a valve properly secured under the brass plate; a brass wire with a ball projects from the upper cap; a pointed wire proceeds from the bottom plate; and this tube is called the luminous conductor.

Entertainment. The disk represented at E is called the Leyden vacuum. It is furnished with a valve under the ball A; to come at which the more readily, the ball may be unferrued: a wire, with a blunt end, projects to within a little of the bottom of the disk, the latter being coated with tin-foil; and a female screw is cemented to the bottom, in order to screw it on the pillar A. F is a syringe to exhaust the air occasionally, either from the luminous conductor or the Leyden vacuum. To do this, unscrew the ball of the Leyden vacuum, or the plate of the luminous conductor, and then screw the syringe in the place of either of these pieces, being careful that the bottom of the female screw G bears close against the leather which covers the shoulders a b c d; then work the syringe, and in a few minutes the glasses will be sufficiently exhausted. H and J are two Leyden bottles; each of which has a female screw fitted to the bottom, in order that they may be conveniently screwed on the pillar A; and the bottle H is furnished with a belt by which it may be screwed side wise to the fame. K and L are two small wires, to be screwed occasionally either into the ball E, the knobs c or f, the cap e, or the socket g on the top of the pillar; the balls may be unferrued from these wires, which will then exhibit a blunt point. M is a wooden table to be screwed occasionally on the glass pillar.

XV. The Leyden Vacuum

XVI. To pierce a Card and other Substances with the Electric Explosion.

Take a card, a quire of paper, or the cover of a book, and keep it close to the outside coating of a charged jar; put one knob of the discharging rod upon the card, quire of paper, &c. so that between the knob and coating of the jar the thickness of that card, or quire of paper, only is interposed; lastly, by bringing the other knob of the discharging rod near the knob of the jar, make the discharge, and the electric matter will pierce a hole (perhaps several) quite through the card or quire of paper. This hole has a bur raised on each side, except the card, &c. be pressed hard between the discharging rod and the jar; which shews that the hole is not made in the direction of the passage of the fluid, but in every direction from the centre of the refisting body. If this experiment be made with two cards instead of one, which however must be kept very little distant from one another, each of the cards after the explosion, will be found pierced with one or more holes, and each hole will have burrs on both surfaces of each card. The hole, or holes, are larger or smaller, according as the card, &c. is more damp or more dry. It is remarkable, that if the nostrils are preferred to it, they will be affected with a phœnephorous, or rather a phœnephorous, smell, just like that produced by an excited electric.

If, instead of this paper, a very thin plate of glass, rodin, sealing-wax, or the like, be interposed between the knob of the discharging rod and the outside coating of the jar, on making the discharge, this will be broken in several pieces. Small insects may also be killed in this manner. They may be held between the outside coating of the jar and the knob of the discharging rod, like the above card; and a shock of a common phial sent through them, will instantly deprive them of
of life, if they are pretty small; but if larger, they will be affected in such a manner, as to appear quite dead on first receiving the stroke; but will, after some time recover: this, however, depends on the quantity of the charge sent through them.

XVII. To shew the Effect of the Shock sent over the Surface of a Card or other Substances.

Put the extremities of two wires upon the surface of a card, or other body of an electric nature, so that they may be in one direction, and about one inch distance from one another; then, by connecting one of the wires with the outside of a charged jar, and the other wire with the knob of the jar, the shock will be made to pass over the card or other body. If the card be made very dry, the lucid track between the wires will be visible upon the card for a considerable time after the explosion. If a piece of common writing paper be used instead of the card, it will be torn by the explosion into very small bits.

If, instead of the card, the explosion is sent over the surface of a piece of glass, this will be marked indelibly by the explosion. Mr Henley has discovered a very remarkable method to increase the effect of the explosion upon the glass; which is by pressing with weights that part of the glass which lies between the two wires (i.e. that part over which the shock is to pass). He puts first a thick piece of ivory upon the glass, and places upon that ivory a weight at pleasure, from one quarter of an ounce to six pounds: The glass in this manner is generally broken by the explosion into innumerable fragments, and some of it is absolutely reduced into an impalpable powder. If the glass is very thick, and resists the force of the explosion, so as not to be broken by it, it will be found marked with the most lively prismatic colours, which are thought to be occasioned by very thin laminae of the glass, in part separated from it by the shock. The weight laid upon the glass is always shooke by the explosion, and sometimes it is thrown quite off from the ivory. This experiment may be most conveniently made with the universal discharger, fig. 8.

XVIII. To swell Clay, and break small Tubs, by the Electric Explosion.

Roll up a piece of soft tobacco-pipe clay in a small cylinder, and infet in it two wires, so that their ends without the clay may be about a fifth part of an inch from one another. If a shock be sent through this clay, by connecting one of the wires with the outside of a charged jar, and the other with the inside, it will be inflated by the shock, i.e. by the spark, that passes between the two wires, and, after the explosion, will appear swelled in the middle. If the shock sent through it is too strong, and the clay not very moist, it will be broken by the explosion, and its fragments scattered in every direction. To make this experiment with a little variation, take a piece of the tube of a tobacco-pipe, about one inch long, and fill its bore with moist clay; then infet in it two wires, as in the above rolled clay; and send a shock through it. This tube will not fail to burst by the force of the explosion, and its fragments will be scattered about to a great distance. Entertainments, if, instead of clay, the abovementioned tube of the ing exp.

XIX. To make the Electric Spark visible in Water.

Fill a glass tube of about half an inch in diameter, and six inches long, with water; and to each extremity of the tube adapt a cork, which may confine the water; through each cork infet a blunt wire, so that the extremities of the wires within the tube may be near one another; lastly, connect one of these wires with the coating of a small charged phial, and touch the other wire with the knob of it; by which means the shock will pass through the wires, and cause a vivid spark to appear between their extremities within the tube. In performing this experiment, care must be taken that the charge be exceedingly weak, or else the tube will burst. If we place in a common drinking glass, almost full of water, two knobbed wires, so bent, that their knobs may be within a little distance of one another in the water, and if one of these wires be connected with the outside coating of a pretty large jar, and the other wire be touched with the knob of it; the explosion which must pass through the water from the knob of one of the wires to that of the other, will disperse water, and break the glass with a surprising violence. This experiment is very dangerous if not conducted with great caution.

XX. To fire Gun-powder.

Make a small cartridge of paper, and fill it with gun-powder, or else fill the tube of a quill with it; infet two wires, one at each extremity, so that their ends within the quill, or cartridge, may be about one inch from one another: this done, send the charge of a phial through the wires; and the spark between their extremities, that are within the cartridge, or quill, will set fire to the gun-powder. If the gun-powder be mixed with steel-flings, it will take fire more readily, and with a very small shock.

XXI. To strike Metals into Glasses.

Take two flaps of common window-glass about three inches long, and half an inch wide; put a small flaps of gold, silver, or brass leaf, between them, and tie them together, or else press them together between the boards of the phial $H$, belonging to the universal discharger, fig. 8. Plate CLXXIV. leaving a little of the metallic leaf out between the glasses at each end; then send a shock through this metallic leaf, and the force of the explosion will drive part of the metal into the glass, and cause a contact with the glass, that it cannot be wiped off, or even be affected by the common men.

XXII.
XXII. To stain Paper or Glass.

Lay a chain, which forms a part of the circuit between the two sides of a charged jar, upon a sheet of white paper; and if a shock be sent through it, the paper will be found stained with a blackish tinge at the very juncture of the links. If the charge be very large, the paper, instead of being stained with spots, is burnt through. If the chain be laid upon a pane of glass instead of paper, the glass will often be found stained with spots in several places, but (as might be expected) not so deep as the paper. If this experiment be made in the dark, a spark will be seen at every juncture of the links; and if the links are small, and the shock pretty strong, the chain will appear illuminated like a line of fire.

XXIII. The Lateral Explosion.

If a jar be discharged with a discharging rod that has no electric handle, the hand that holds it, in making the discharge, feels some kind of shock, especially when the charge is considerable. In other words: A perfon, or any conducting substance, that is connected with one side of a jar, but forms no part of the circuit, will feel a kind of shock, i.e., some effect of the discharge. This may be rendered visible in the following manner. Connect with the outside of a charged jar a piece of chain; then discharge the jar thro' another circuit, as for instance with a discharging rod in the common way, and the chain that communicates with the outside of the jar, and which makes no part of the circuit, will appear lucid in the dark, i.e., sparks will appear between the links; which shows, that the electric fluid, natural to that chain, must by some means have been disturbed. This chain will also appear luminous, if it is not in contact with the outside of the jar, but only near it; and on making the discharge a spark will be seen between the jar and the end of the chain near it. This electrical appearance out of the circuit of a discharging jar, is that which we call the lateral explosion; and to make it appear in the most conspicuous manner, observe the following method, which is that of Dr. Priestley.

When a jar is charged, and stands upon the table as, usual, inflate a thick metallic rod, and place it so that one of its ends may be contiguous to the outside coating of the jar; and within about half an inch of its other end place a body of about six or seven feet in length, and a few inches in breadth; then put a chain upon the table, so that one of its ends may be about an inch and a half distant from the coating of the jar; at the other end of the chain apply one knob of the discharging rod, and bring the other knob to the wire of the jar, in order to make the explosion. On making the discharge in this manner, a strong spark will be seen between the inflated rod, which communicates with the coating of the jar and the body near its extremity, which spark does not alter the state of that body in respect to electricity. Whether this lateral explosion is received on flat and smooth surfaces, or upon sharp points, the spark is always equally long and vivid.

XXIV. To discharge a Jar silently.

When a large jar is fully charged, which would give a terrible shock, put one of your hands in contact with its outside coating; with the other hold a sharp pointed Expere-needle, and keeping the point directed towards the knob of the jar, proceed gradually near it, until the point of the needle touches the knob. This operation discharges the jar entirely; and you will either receive no shock at all, or so small a one as can hardly be perceived. The point of the needle, therefore, has silently and gradually drawn all the superfluous fluid from the inside surface of the electric jar.

XXV. Drawing the Electricity from the Prime Conductor by a Point.

Let a person hold the knob of a brass rod at such a distance from the prime conductor, that sparks may easily fly from the latter to the former, when the machine is in motion. Then let the winch be turned; and while the sparks are following one another, present the sharp point of a needle at nearly twice the distance from the prime conductor, that the knobbed rod is held; and you will observe that no more sparks will go to the rod:—remove the needle entirely, and the sparks will be seen again;—present the needle, and the sparks disappear: which evidently shows, that the point of the needle draws off silently almost all the fluid that the cylinder throws upon the prime conductor.

If the needle be fixed upon the prime conductor with the point outward, and the knob of a discharging rod, or the knob of a finger, be brought very near the prime conductor, though the excitation of the cylinder may be very strong, yet you will perceive that no spark, or an exceeding small one, can be obtained from the prime conductor.

XXVI. The Electrofied Cotton.

Take a small lock of cotton, extended in every direction as much as conveniently can be done; and by a linen thread about five or six inches long, or by a thread drawn out of the same cotton, tie it to the end of the prime conductor: then let the winch of the machine be turned, and the lock of cotton, on being electrified, will immediately swell, by repelling its filaments from one another, and will stretch itself towards the nearest conductor. In this situation let the winch be kept turning, and present the end of your finger, or the knob of a wire, towards the lock of cotton, which will then immediately move towards the finger, and endeavour to touch it; but take with the other hand a pointed needle, and present its point towards the cotton, a little above the end of the finger, and you will observe the cotton immediately to shrink upward, and move towards the prime conductor.—Remove the needle, and the cotton will come again towards the finger. Present the needle, and the cotton will shrink again.

XXVII. The Electrofied Bladder.

Take a large bladder well blown, and cover it with gold, silver, or brass leaf, flicking it with gum-water; suspend the bladder at the end of a silk thread, at least six or seven feet long, hanging from the ceiling of the room; and electrify the bladder, by giving it a strong spark with the knob of a charged bottle: this done, take a knobbled wire, and present it to the bladder when motionless; and you will perceive, that the knob ap-
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Plate XXVIII. The Spider seemingly animated by Electricity.

FIG. 51. represents an elecric jar, having a wire C D E fastened on its outside, which is bent so as to have its knob E as high as the knob A—B is a spider made of cork, with a few short threads run thro' it to represent its legs. The spider is fastened at the end of a silk thread, proceeding from the ceiling of the room, or from any other support, so that the spider may hang mid-way between the two knobs A, E, when the jar is not charged. Let the place of the jar upon the table be marked; then charge the jar, by bringing its knob A in contact with the prime conductor, and replace it in its marked place. The spider will now begin to move from knob to knob, and continue this motion for a considerable time, sometimes for several hours.

The inside of the jar being charged positively, the spider is attracted by the knob A, which communicates to it a small quantity of electricity; the spider then becoming possefled of the same electricity with the knob A, is repelled by it, and runs to the knob E, where it discharges its electricity, and is then attracted by the knob A, and so on. In this manner the jar is gradually discharged; and when the discharge is nearly completed, the spider finishes its motion.

XXIX. The Dancing Balls.

Fix a pointed wire upon the prime conductor, with the point outward; then take a glass tumbler, grasp it with your hands, and present its inside surface to the point of the wire upon the prime conductor while the machine is in motion: the glass in this manner will soon become charged; for its inside surface acquires the electricity from the point, and the hands serve as a coating for the outside. This done, put a few pith-balls upon the table, and cover them with this charged glass tumbler. The balls will immediately begin to leap up along the sides of the glass as represented fig. 39, and will continue their motion for a considerable time.

XXX. The Electrical Jack.

This is an invention of Dr Franklin's, and turns with considerable force, so that it may sometimes be used for the purposes of a common jack. A small upright shaft of wood passes at right angles through a thin round plate of about 12 inches diameter, and turns on a sharp point of iron fixed in the lower end, while a strong wire in the upper end, passing through a small hole in a thin brass plate, keeps the shaft truly vertical. About 30 radii, of equal length, made of thin glass cut into narrow flaps, lie horizontally from the circumference of the board, the ends most distant from the centre being about four inches apart. On Entertaining the end of every one a brass thimble is fixed. If now the wire of a bottle electrified in the common way be brought near the circumference of this wheel, it will attract the nearest thimble, and so put the wheel in motion. That thimble, in passing by, receives a spark; and thereby being electrified, is repelled, and so driven forwards; while a second, being attracted, approaches the wire, instead of being attracted, as they were at first, are repelled, and the motion presently ceases. But if another bottle which had been charged through the coating, or otherwise negatively electrified, is placed near the same wheel, its wire will attract the thimble repelled by the first, and thereby double the force that carries the wheel round. The wheel therefore moves very swiftly, turning round 12 or 15 times in a minute, and with such force, that a large foul spirited on the upper shaft may be roafted by means of it.

XXXI. The Self-moving Wheel.

This appears more surprising than the former, tho' constructed upon the same principles. It is made of a thin round plate of window-glass 17 inches in diameter, well gilt on both sides, till but two inches next the edge. Two small hemispheres of wood are then fixed with cement to the middle of the upper and under sides, centrally opposite; and in each of them a strong thick wire eight or ten inches long, which together make the axis of the wheel. It turns horizontally on a point at the lower end of its axis, which rests on a bit of brass cemented within a glass salf-cellier. The upper end of its axis passes through a hole in a thin brass plate, cemented to a long and strong piece of glass; which keeps it fix or eight inches distant from any non-electric, and has a small ball of wax or metal on its top to keep in the fire.

In a circle on the table which supports the wheel, are fixed 12 small pillars of glass, at about 11 inches distance, with a thimble on the top of each. On the edge of the wheel is a small leather bullet, communicating by a wire with the gilding of the upper surface of the wheel; and about fix inches from it is another bullet communicating in like manner with the under surface. When the wheel is to be charged by the upper surface, a communication must be made from the under surface to the table. As soon as it is well charged, it begins to move. The bullet nearest to a pillar moves towards the thimble on that pillar; and, passing by, electrifies it, and is then repelled from it. The succeeding bullet, which communicates with the other surface of the glass, more strongly attracts that thimble on account of its being electrified before by the other bullet; and thus the wheel increases its motion, till the resistance of the air regulates it. It will go half an hour; and make, one minute with another, 20 turns in a minute, which is 600 times in the whole; the bullet in the upper surface giving in each turn 12 sparks to the thimbles, making in all 2500 sparks; while the same quantity of fire is thought to be received by the under bullet. The whole space moved over by these bullets in the mean time is 2500 feet. If, instead
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fig. 57.

XXXII. The Magic Picture.

This is a contrivance of Mr Kinnerley; and is perhaps more calculated to give surpise than any other experiment in electricity. It is made in the following manner: Having a large mezzotint, with a frame and glass (suppose of a king), take out the print, and cut a panel out of it near two inches distant from the frame all round. If the cut be through the picture, it is nothing the worse. With thin paste, or gum-water, fix the board that is cut off, on the inside of the glass, preffing it smooth and close; then fill up the vacancy, by gilding the glass well with leaf-gold or brass. Gild up the glass, and when it is dry, cover it, by passing to bring the corresponding parts of the board and picture together, by which the picture will appear of a piece as at first; only part is behind the glass and part before. Lastly, hold the picture horizontally by the top, and place a little moveable gilt crown on the king's head. If now the picture is moderately electrified, and another person take hold of the frame with one hand, so that his fingers touch its inside gilding, and with the other endeavour to take off the crown, he will receive a terrible blow, and fall in the attempt.

The operator, who holds the picture by the upper end, where the inside of the frame is not gilt, to prevent its falling, feels nothing of the shock; and may touch the face of the picture without danger, which he pretends to be a test of his loyalty.

XXXIII. The Thunder-house.

Fig. 53. is an instrument representing the side of a house, either furnished with a metallic conductor, or not; by which both the bad effects of lightning striking upon a house not properly secured, and the usefulness of metallic conductors, may be clearly represented. A is a board about three quarters of an inch thick, and shaped like the gable-end of a house. This board is fixed perpendicularly upon the bottom-board B, upon which the perpendicular glass pillar GD is also fixed in a hole about eight inches distant from the basis of the board A. A square hole ILMK, about a quarter of an inch deep, and nearly one inch wide, is made in the board A, and is filled with a square piece of wood nearly of the same dimensions. It is mentioned nearly of the same dimensions, because it must go so easily into the hole, that it may drop off by the least liability of the instrument. A wire LG is fastened diagonally to this square piece of wood. Another wire HB of the same thickness, having a brass ball H, screwed on its pointed extremity, is fastened upon the board A; so also is the wire MN, which is shaped in a ring at O. From the upper extremity of the glass pillar GD, a crooked wire proceeds, having a spring socket F, through which a double knobbled wire slips perpendicularly, the lower knob of which falls just above the knob H. The glass pillar DG must not be made very flat into the bottom board; but it must be fixed so as it may be pretty easily moved round its own axis; which means the brass ball C may be brought nearer or farther from the ball H, without touching the part EFG. Now when the square piece of wood LMK (which may represent the shutter of a window or the like) is fixed into the hole fo, that the wire LK stands in the dotted representation IM, then the metallic communication from H to O is complete, and the instrument represents a house furnished with a proper metallic conductor; but if the square piece of wood LMK is fixed fo, that the wire LK stands in the direction LI, as represented in the figure, then the metallic conductor HO, from the top of the house to its bottom, is interrupted at IM, in which case the house is not properly secured.

Fix the piece of wood LMK fo, that its wire may be as represented in the figure, in which case the metallic conductor HO is discontinued. Let the ball G be fixed at about half an inch perpendicular distance from the ball H; then, by turning the glass pillar DC, remove the former ball from the latter; by a wire or chain connect the wire EF with the wire Q of the jar P, and let another wire or chain, fastened to the hook O, touch the outside coating of the jar. Connect the wire Q with the prime conductor, and charge the jar; then, by turning the glass pillar DC, let the ball G come gradually near the ball H; and when they are arrived sufficiently near one another, you will observe that the jar explodes, and the piece of wood LMK is pushed out of the hole to a considerable distance from the thunder-house. Now the ball G, in this experiment, represents an electrified cloud, which, when it is arrived sufficiently near the top of the house A, the electricity strikes it; and as this house is not secured with a proper conductor, the explosion breaks off a part, i.e. knocks off the piece of wood IM.

Repeat the experiment with only this variation, viz. that this piece of wood IM is situated fo, that the wire LK may stand in the situation IM, in which case the conductor HO is not discontinued; and you will observe, that the explosion will have no effect upon the piece of wood LM, thus remaining in the hole unmoved; which shows the usefulness of the metallic conductor.

Further. UnscREW the brafs ball H from the wire HI, fo that this may remain pointed. With this difference only in the apparatus, repeat both the above experiments; and you will find that the piece of wood IM is in neither case moved from its place, nor any explosion will be heard; which not only demonstrates the preference of the conductors with pointed termination to those with blunted ones; but also shows that a house furnished with sharp terminations, although not furnished with a regular metallic conductor, is still sufficiently guarded against the effects of lightning.

This apparatus is sometimes made in the shape of a house, as represented fig. 53. where, for the sake of
are not represented. The gable-end \( AG \) represents that of the thunder-house, and may be used in the same manner with that above described, or more readily by the following method. Let one ball of the discharging rod touch the ball of the charged fly, and the other the knob \( A \) of the conductor \( AC \) of the thunder-house; the jar will then of course explode, and the fluid will act upon the conductor just mentioned. The conducting wire at the windows \( hh \) must be placed in a line. The sides and gable \( AG \) of the house, are connected with the bottom by hinges; and the building is kept together by a ridge on the top of the jar, by the discharging rod; the discharge will fire the powder, and the explosion of the latter will throw off the roof, with the sides, back, and front, so that they will all fall down together. The figures \( g \) and \( j \) in the side of the house represent a small ram-rod for the tube \( a \), and a pricker for the touch-hole at \( C \). Fig. 44 represents a mahogany pyramid, by means of which the same experiment may be exhibited. It is used in a manner similar to that just now described, the piece at \( a \) being thrown out by the discharge; by which means the upper part falls down in three pieces.

Mr. Jones of Holborn makes the front of the common thunder-houses, as well as the powder-house above described, with two pieces of wood or windows \( hh \), which, by being placed in proper situations, the one to conduct and the other to resist the fluid will illustrate by one discharge the usefulness of good conductors for securing buildings or magazines from the explosion of thunder, as well as the danger of using imperfect ones.

XXXIV. The Electric Fly.

This fly is composed of small brass wires, fig. 49, fixed into a cap of brass also, easily moveable upon an axis of the same metal, and exactly balanced, so that they may turn with the smallest force. The ends, which ought to be very sharp, are called clappers. They, with regard to those belonging to \( a, b \) in the figure; though the two sets of points constituting the two flies there represented, are contrary to each other; so that the whole flies must have a contrary motion. Fixing the axle with the two flies upon the prime conductor, and working the machine, both will begin to turn very swiftly, each in a direction contrary to that of the points. In this manner, with a powerful machine, a great many flies may be made to turn either in the same or in contrary directions; and by their gradual increase or decrease in size may represent a cone or other figure; for the course of each will be marked by a line of fire, and thus the whole will exhibit a beautiful appearance in the dark. The light is said to be more brilliant when the ends are slightly covered with sealing-wax, grease, or other electric matter.

In this experiment the fly will turn the same way whether the electricity be positive or negative; the reason of which will easily be conceived from the theory already laid down, viz. that in positive electricity the fluid issues from the body electrified, and that in negative electricity it enters into it. In the former case, the recoil of the fluid, which acts equally on the air and on the point from whence it issues, must continually put the point the contrary way; and in negative electricity, when the point solicits a continual draught of electric matter from the air the direct impulse of the former must also produce a motion in the point in the course in which the fluid itself moves. In vacuo no motion is produced; because there is no air on which the fluid may act when it issues from the point. In like manner, when air is inclosed in a glass vessel, the motion of the electric fly soon stops; because the fluid cannot easily get through the air and the glass, and therefore its motions are impeded so that it cannot press with force sufficient to produce motion. On applying a conductor to the outside of the glass, the fly renewed its motion; because an opportunity is now given to the fluid to escape, by running through the glass. But this, for the reasons already given, must soon cease, because a contrary action of the fluid instantly begins to take place; and in a short time becomes equal to that which urges it forward from the machine. The motion of the fly, therefore, stops for the same reason that a Leyden phial becomes at last saturated and cannot receive a greater charge; and which has been already so fully discussed, that it would be superfluous to say more on the subject.

Fig. 50 shows another fly which turns perpendicularly, and which will be readily understood from what has been already said.

XXXV. The Elecrified Bells.

Fig. 35 represents an instrument having three bells, which are made to ring by electric attraction and repulsion. \( B \) is a brass rod; furnished with a ring \( A \) of the same metal, by which it is suspended from another rod fixed in the prime conductor. The outer bells \( C \) and \( E \) are suspended by brass chains; but the middle bell \( D \) and the two small brass clappers between \( CD \) and \( DE \) are suspended by silk threads. From the concave under part of the bell \( D \) a chain proceeds, which falls upon the table, and has a silk thread \( E \) at its extremity. When this apparatus is hung to the conductor by the ring \( A \), and the cylinder of the machine gently turned, the clappers will fly from bell to bell with a rapid motion, and the bells will ring as long as they are kept electrified. The two bells \( C \) and \( E \) being suspended by brass chains, are first electrified: hence they attract the clappers, communicate to them a little electricity, and repel them to the unelecrified bell \( D \); upon which the clappers depoite their electricity, and move again to the bells \( C, E \), from which they acquire more, and so on. If, by holding the silk thread \( F \), the chain of the middle bell be raised from the table, the bells after ringing a little while will stop; because the bell \( D \) will have no opportunity of conveying the electricity it receives from the clappers to the ground, being insulated by the silk thread. In the dark, sparks will be seen between the clappers and bells.

Fig. 36 represents a set of bells more elegantly mounted, and which produce a better sound. In these the knob \( a \) must communicate with the conductor when the apparatus is made use of. Fig. 37 represents
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of the machine, or at and reduce manner described in the foregoing experiment, and the clapper attracted by each of the bells alternately in its rotation; which, if they are properly turned, will produce a pleasing and harmonious sound.

XXXVI. To fire a Pifhol or Cannon by Inflammable Air.

Fig. 40. represents a brass pifhol for inflammable air. It consists principally of a chamber, to the mouth D of which a cork is fitted: a glass tube F is cemented into the top of the chamber, through which a brass wire passes, and is bent within side so as to approach within an eighth part of an inch of the side. On the outside end of this wire is screwed a brass ball A, which serves to receive a spark from the conductor of the machine, and conduct it in that form to the inside of the pifhol. The inflammable air with which the pifhol is to be charged may be made in a common stone-warcior glass bottle, by mixing a handful of iron-filings with about two wine-glassfuls of water and near one of oil of vitriol. The air, when thus made, may be about two wine-glassfuls of water and near one of oil. To make use of the pifhol, take the end of the former on fire. It burns with remarkable brilliancy and rapidity, and is bent within an eighth part of an inch of the side. If this instrument be held by one of its extremities, and its other extremity be presented to the prime conductor, every spark that it receives from the prime conductor will cause small sparks to appear between all the round pieces of tin-foil stuck upon the innermost tube, which in the dark affords a pleasing spectacle, the instrument appearing encompassed by a spiral line of fire.

Fig. 42. represents an instrument composed of two glass tubes C D, one within another, and closed with two knobbled brass caps 4 and B. The innermost of these has a spiral row of small round pieces of tin-foil stuck upon its outside surface, and lying at about one-thirtieth of an inch from each other. If this instrument be held by one of its extremities, and its other extremity be presented to the prime conductor, every spark that it receives from the prime conductor will cause small sparks to appear between all the round pieces of tin-foil stuck upon the innermost tube, which in the dark affords a pleasing spectacle, the instrument appearing encompassed by a spiral line of fire.

Fig. 45. represents several spiral tubes placed round a board, in the middle of which is screwed a glass pillar, and on the top of this pillar is cemented a brass cap with a fine steel point. In this a brass wire turns, having a brass ball at each end, nicely balanced on the wire. To make use of this apparatus, place the middle of the turning wire under a ball proceeding from the entertain conductor, so that it may receive a succession of sparks from the ball; then pull the wire gently round; and the balls in their relative motions will give a spark to each tube, and thereby illuminate them down to the board, which, from its brilliancy and rapid motion affords a most beautiful and pleasing sight.

The small pieces of tin-foil are sometimes stuck on a flat piece of glass ABCD, fig. 44. so as to represent various fanciful figures. Upon the same principle is the luminous word light produced. It is formed by the small separations of the tin-foil palled on a piece of glass fixed in a frame of barked wood, as represented fig. 45. To use this, the frame must be held in the hand, and the ball G preferred to the conductor. The spark then will be exhibited in the intervals composing the word; from whence it passes to the hook at h, and thence to the ground by a chain. The brilliancy of this is equal to that of the spirals.

XXXVIII. To fire a Piece of Iron-wire in Dephlogisticated Air.

The apparatus for this is represented fig. 28, no. 2. As this is done, it may easily be inverted in the brass knob D. The jar comes out of the bottom C, and is filled with the dephlogisticated air, as directed under the article Dynamics. The electricity of a common jar being then instantly sent down through the ball and wire at A, an explosion takes place betwixt the end of the small wire and the lower ball B, which sets the end of the former on fire. It burns with remarkable brilliancy; and by reason of the spiral shape into which it is twisted, shows the appearance of a small sun moving from the top to the bottom of the jar, and slowly moving round as the wire, which is of a spiral shape, gradually burns away.

XXXIX. The Electrified Capillary Syphon.

Let a small bucket of metal filled with water be suspended from the prime conductor, and put in a glass syphon so narrow in the extremity that the water may just drop from it. If in this disposition of the apparatus the winch of the machine be turned, the water, which when not electrified by drops, will now run in a full stream, or even be subdivided into smaller streams; and if the experiment be made in the dark, the appearance will be very beautiful. The same phenomenon will be exhibited by a small bucket with a jet, as represented fig. 46. or the experiment may be agreeably varied, by hanging one bucket from a positive conductor and another from a negative one; so that the ends of the tubes or jets may be about three or four inches from each other. The stream issuing from the one will be attracted by that issuing from the other, and both will unite into one; but though both are luminous in the dark before meeting, the united stream will not be so much as to unite by the electricity has been stronger than the other.

XL. To illuminate Eggs.

Fig. 55. represents a mahogany stand so constructed as to hold three eggs at a greater or smaller distance, according to the position of the sliding pieces. A chain G is placed at the bottom in such a manner as to
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To touch the bottom of the egg at B with one end, and with its other the outside coating of a charged jar. The sliding wire A at top is made to touch the upper egg; and the distance of the eggs afunder should not exceed the quarter or eighth part of an inch. The electricity being by means of the discharging rod from the ball and wire at A, will in a darkened room render the eggs very luminous and transparent, as has already been mentioned.

XLI. To render Ivory or Boxwood luminous.

Place an ivory ball on the prime conductor of the machine, and take a strong spark, or send the charge of a Leyden bottle through its centre, the ball will appear perfectly luminous; but if the charge be not taken through the centre, it will pass over the surface of the ball and corrod it. A spark taken through a ball of boxwood not only illuminates the whole, but makes it appear of a beautiful crimson or rather fine scarlet colour.

XLII. To illuminate Water.

Connect one end of a chain with the outside of a charged jar, and let the other lie upon the table. Place the end of another piece of chain at about one quarter of an inch from the former; then let a decanter of water be placed upon the chain ends; and on making a discharge, the water will appear perfectly and beautifully luminous.

XLIII. To make a beautiful Appearance in vacuo.

Fig. 38. represents a glass barometer tube, having on the end a steel cap fastened to the glass with cement. From this proceed a wire and ball c. Fill this tube with quicksilver, and then by bending up a large bubble of air, and repeatedly inverting the tube, free the quicksilver and iron ball from air; then put a small drop of ether on the quicksilver, and put the finger on the end of the glass tube; and then invert the end f in a basin of quicksilver, taking care not to remove the finger from the end of the tube till the latter be immersed under the surface of the quicksilver. When the finger is removed, the mercury will descend, and the ether expand itself; present the metallic top of the tube to a large charged conductor, and a beautiful green spark will pass through the vapour of the ether from the ball d to the quicksilver. By admitting a small quantity of air into the tube, an appearance something like a falling star is produced.

XLIV. To render Gold-leaf, or Dutch-metal luminous.

This is done by discharging the contents of a small Leyden jar over it. A strip of gold leaf one-eighth of an inch in breadth and a yard long, will frequently be illuminated throughout its whole extent, by the explosion of a jar containing two gallons. This experiment may be beautifully diversified, by laying the gold or silver leaf on a piece of glass, and then placing the glass in water; for the whole gold-leaf will appear most brilliantly luminous in the water, by expelling it thus circumvented to the explosion of a battery.

XLV. To perforate a Glass Tube.

Fig. 59. represents a small glass tube flopped at one end with a piece of cork; k is a wire with a ball, at Entertain one end of which is a brass ball; the other paffes thro’ a cork fitted to the upper part of the tube. This end of the wire is bent at right angles, in such a manner as to approach the side of the tube. To perform the experiment, take out the upper cork and wire, and then pour some solid oil into the tube; replace the cork, and push down the wire, so that the end of it may be near or rather below the surface of the oil; present the ball to the electrified conductor, holding the finger or any other conducting substance opposite to the bent end of the wire; and when the spark paffes from the conductor to the brass ball, the same will pass along the wire, perforating the tube in order to get at the finger, and produce a curious agitation of the oil.

XLVI. The Inflammable Air-Lamp.

Fig. 60. represents this machine, which is an invention of M. Volta. A is a brass globe to contain the inflammable air; B, a brass basin or reservoir to hold water; D, a cock to form occasionally a communication between the reservoir of water and that of air. The water passes into the latter through the metal pipe gg, which is fixed to the upper part of the reservoir A; as is a small cock to cut off or open a communication with the air in the ball and the jet K. N is a small pipe to hold a piece of wax taper; L, a brass pillar, on the top of which is a ball of the same metal; a is a pillar of glass with a socket at top, in which the wire b slides, having a ball screwed on the end of it. F is a cock by which the ball A is filled with inflammable air, and which afterwards serves to confine the air, and what water falls from the basin B into the ball A.

To use this instrument, after having filled the reservoir A with pure inflammable air and the basin with water, turn the cocks D and N, and the water which falls from the basin will force out some of the inflammable air, and cause it to pass through the jet K into the air. If an electric spark be made to pass from the brass ball m to that marked n, the inflammable jet which passes through the pipe K will be fired. To extinguish the lamp, first shut the cock s, and then the cock D. The inflammable air is made of the usual ingredients, viz. iron- filings and vitriolic acid; and the reservoir is filled in the following manner: Having previously filled A with water, place the foot K in a tub of that fluid which may cover it, so that the bent glass tube through which the air passes may pass commodiously below the foot of the lamp. When the air has nearly driven out all the water, turn the cock F, and the apparatus is ready for use. This instrument is convenient for preserving a quantity of inflammable air ready for any occasional experiment, as charging the inflammable air-pistol, &c. It is also convenient for lighting a candle for economical purposes, as the least spark from an electrophorus or a small bottle is sufficient to fire the air.

XLVII. Imitations of the Planetary Motions.

See below, Uses of the Electric fluid in the System of Nature.

XLVIII. Beautiful Figures produced in Powdered Roof, &c. fired over an Electric Substance. Ibid.
Sect. IX. Experiments of a Miscellaneous Nature, viz. those relating to the Effects of the Electric Fluid on Colours; on its Velocity; the Changes of Electric into Conducting Substances; the impossibility of forcing the Fluid through a perfect Vacuum; the Power of Batteries; its direction in various Cases; Improvements in the method of Excitation, &c.

These experiments, though far from being entertaining, we have thought proper to classify under a different title, as many might with amusement themselves with producing an agreeable and beautiful phenomenon who would not choose to make experiments for the sake of investigating unknown subjects, where perhaps little else than the labour of making the experiment might be the reward of the operator. These experiments also may be truly said to be of an anomalous nature; as not being founded upon any known laws of electricity, but rather a collection of facts; from some of which we may afterwards deduce the laws by which this sublime fluid is occasionally manifested. We shall begin with experiments made by Mr Cavallo upon sublimes painted over with colours of different kinds. They were occasioned by his having observed that an electric shock, sent over the surface of a card, made a black stroke upon a red spot, from which he was induced to try the effects of sending shocks over cards painted with different water-colours. The force employed was generally about one foot and an half of charged glass; and the shocks were sent over the cards while the latter were in a very dry state.

Vermilion was marked with a strong black track, about one-tenth of an inch wide. This stroke is generally single, as represented by $AB$, fig. 74 of Plate CLXXVII. Sometimes it is divided in two towards the middle, like $EF$; and sometimes, particularly when the wires are set very dry from one another, the stroke is not continued, but interrupted in the middle, like $GH$. It often, although not always, happens, that the impression is marked stronger at the extremity of that wire from which the electric fluid issues, as it appears at $E$, supposing that the wire $C$ communicates with the positive side of the jar; whereas the extremity of the stroke, contiguous to the point of the wire $D$, is neither so strongly marked, nor surrounds the wire so much, as the other extremity $E$.

Carmine received a faint and slender impression of a purple colour.

Verdigris was shaken off from the surface of the card; except when it had been mixed with strong gum-water, in which case it received a very faint impression.

White-lead was marked with a long black track, not so broad as that on vermilion.

Red lead was marked with a faint mark much like carmine.

The other colours I tried were orpiment, gamboge, sap-green, red-ink, ultramarine, Prussian blue, and a few others, which were compounds of the above; but they received no impression.

It having been intimated, that the strong black mark, which vermilion receives from the electric shock, might possibly be owing to the great quantity of sulphur contained in that mineral, I was induced to make the following experiment. I mixed together equal quantities of orpiment and flour of sulphur; and with this mixture, by the help, as usual, of very diluted gum-water, I painted a card; but the electric shock sent over it left not the least impression.

Deficient of carrying this investigation on colours a little further, with a particular view to determine something relative to the properties of lamp-black and oil, I procured some pieces of paper painted on both sides with oil colours; and sending the charge of two feet of coated glass over each of them, by making the interruption of the circuit upon the surfaces, I observed that the pieces of paper painted with lamp-black, Prussian blue, vermilion, and purple brown, were torn by the explosion; but white lead, Naples yellow, English ochre, and verdigris, remained unhurt.

The same shock sent over a piece of paper painted very thickly with lamp-black and oil left not the least impression. I sent the shock also over a piece of paper unequally painted with purple brown, and the paper was torn where the paint lay very thin, but remained unhurt where the paint was evidently thicker. These experiments I repeated several times and with some little variation, which naturally produced different effects; however they all seem to point out the following propositions.

I. A coat of oil-paint over any substance, defends it from the effects of such an electric shock as would otherwise injure it; but by no means defends it from any electric shock whatever. II. No one colour seems preferable to the others, if they are equal in substance, and equally well mixed with oil; but a thick coating does certainly afford a better defence than a thinner one.

By rubbing the abovementioned pieces of paper, I find that the paper painted with lamp-black and oil is more easily excited, and acquires a stronger electricity, than the papers painted with the other colours; and, perhaps, on this account it may be, that lamp-black and oil might resist the shock somewhat better than the other paints.

It is remarkable, that vermilion receives the black impression, when painted with linseed oil, nearly as well as when painted with water. The paper painted with white lead and oil receives also a black mark; but its nature is very singular. The track, when first painted...
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Electric shock calcines, vitrifies, and revivifies metals.

Another very remarkable property of the electric fluid is, that it both calcines, vitrifies, and revivifies, metals. The calcination of them appears from Dr. Priestley's experiments with the brafs chain, formerly mentioned, where the black duft was plainly a calx of the metal. The vitrification is performed by exploding small wires of any kind, with the shock of a battery. In this case, the small globe of metal, even if made gold, silver, or platinum, are found to be completely vitrified. The revivification is an experiment of Mr. Beccaria. This he did by making the explosion between two pieces of the calcis; and thus he revivified several metallic substances, particularly zinc, and even produced real quicksilver from cinnabar. In this case, he always observed streaks of black beyond the coloured metallic stains; owing, as he supposed, to the phlogiston driven from the parts that were vitrified, when the other part revivified the calx.

Mr. Beccaria also discovered another very remarkable property of the electric matter; namely, that when it is obliged to pass through air, or any other substance through which it makes its way with difficulty, it throws before it all light conducting substances it can find, in order to facilitate its own passage; and thus it will pass through a greater quantity of resisting medium than it would otherwise be able to do. The experiments from which Mr. Beccaria drew this conclusion, were the following. He put a narrow piece of leaf-silver between two plates of wax, laying it across them, but so that it did not quite reach one of the sides. The discharge being made through this strip of metal, by bringing a wire opposite to the silver, at the place where it was discontinued; the silver was found melted, and part of it diffused all along the track that the electric matter took between the plates of wax, from the silver to the wire. Happening once to receive, inadvertently, the charge of a small jar through some smoke of spirit of nitre, a hole was made in his thumb, and which he thought could only have been made by the acid carried along by the electric fluid. Dr. Priestley hath made several more experiments, in order to ascertain this remarkable property; and of which he gives the following account.

"I discharged frequent shocks, both of a common jar, and another of three square feet, through trains of brafs duft, laid on a floor of baked wood, making interruptions in various parts of the train; and always found the brafs dust scattered in the intervals, so as to connect the two disjointed ends of the train; but then it was likewife scattered nearly as much from almost all other parts of the train, and in all directions. The scattering from the train itself was probably occasioned by small electric sparks between the particles of the dust; which, causing a vacuum in the air, drove all that light matter to a considerable distance. But the particles of the dust, which were thrown in the intervals of the train, some of which were at least three inches, could hardly be conveyed in that manner.

"When small trains were laid, the dispersion was the most considerable, and a light was very visible in the dark, illuminating the whole circuit. It made no difference, in any of these experiments, which way the shock was discharged.

"When I laid a considerable quantity of the dust at the ends of two pieces of chain, through which the shock passed, at the distance of about three inches from one another, the dust was always dispersed over the whole interval, but chiefly laterally; so that the greatest quantity of it lay in arcs, extending both ways, and leaving very little of it in the middle of the path. It is probable, that the electric power would have spread it equably, but that the vacuum made in the air, by the passage of the electric fluid, bound one heap of dust to the other, dispersed it from the middle part.

"I then intusled a jar of three square feet, and upon an adjoining glafs-stand laid a heap of brafs dust; and at the distance of seven or eight inches a brafs rod communicating with the outside of the jar. Upon bringing another rod, communicating with the inside, upon the heap of dust, it was dispersed in a beautiful manner, but not one way more than another. However, it presently reached the rod communicating with the outside.

"Making two heaps, about eight inches asunder, I brought one rod communicating with the inside upon one of them, and another rod communicating with the outside upon the other. But the heaps were dispersed in all directions, and soon met; preferably after which the jar was discharged, by means of this dispersed dust, in one full explosion. When the two heaps were too far asunder to promote a full discharge at once, a gradual discharge was made through the scattered particles of the dust.

"When one heap of dust was laid in the centre of the stand, and the two rods were made to approach on each side of it, they each attracted the dust from the side of the heap next to them, and repelled it again in all directions. When they came very near the heap, the discharge was made through it, without giving it any particular motion.

"All these experiments show, that light bodies possessed of a considerable share of electricity, disperse in all directions, carrying the electric matter to places not abounding with it; and that they sometimes promote a sudden discharge of great quantities of that matter from places where it was lodged, to places where there was a defect of it. But an accident led me to a much more beautiful, and perhaps a more satisfactory, manner of demonstrating the last part of this proposition, than any that I hit upon while I was pursuing my experiments with that design.

"Hanging a drop of water upon the knob of a brafs rod communicating with the inside of my battery, in order to observe what variety it might occasion in the circular spots above mentioned, I was greatly surprised to find the explosion made all at once, at the distance of two inches.
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"I afterwards put some brass dust upon a plate of metal communicating with the inside of the battery; and making the discharge through the dust, it exploded at the distance of an inch and a half. The dust rose towards the discharged rod, and from thence was diffused in all directions.

"These experiments are the more remarkable, as they demonstrate a great difference between the distance at which the battery may be made to discharge at once, by the help of these light bodies, and without them. When the discharge of a battery by the knobs of brass rods, in the open air, is at the distance of about half an inch; it will, by this means, be made at about two inches."

The motions of the electric fluid, though prodigiously quick, are not instantaneous. The shock of the Leyden phial, indeed, hath been transmitted through wires of several miles in length, without taking up any sensible space of time. That is, supposing two persons to hold the ends of the wire, one communicating with the knob, and the other with the outside coating of the phial, both would feel the shock at the same instant; nor would it make any alteration though a considerable part of the surface of the ground was made part of the conductor. Dr. Priestley relates several very curious experiments made with a view to ascertain this point soon after the Leyden phial was discovered. These experiments were planned and directed by Dr. Watson, who was present at every one of them. His chief assistants were Martin Folkes, Esq.; president of the royal society, Lord Charles Cavendish, Dr. Bevis, Mr. Graham, Dr. Birch, Mr. Peter Daval, Mr. Trembly, Mr. Ellisott, Mr. Robbins, and Mr. Short. Many other persons, and some of distinction, gave their attendance occasionally.

Dr. Watson, who wrote the history of their proceedings, in order to lay them before the royal society, begins with observing (what was verified in all their experiments), that the electric shock is not, strictly speaking, conducted in the shortest manner, unless the body through which it passes conduct equally well; for that, if they conduct unequally, the circuit is always formed through the best conductor, though the length of it be ever so great.

The first attempt the gentlemen made, was to convey the electric shock across the river Thames, making use of the water of the river for one part of the chain of communication. This they accomplished on the 14th and 18th of July 1747, by fastening a wire all along Westminster bridge, at a considerable height above the water. One end of this wire communicated with the coating of a charged phial, the other being held by an observer, who, in his other hand, held an iron rod, which he dipped into the river. On the opposite side of the river stood a gentleman, who likewise held an iron rod in the river with one hand; and in the other held a wire, the extremity of which might be brought into contact with the wire of the phial.

Upon making the discharge, the shock was felt by the observers on both sides the river, but more sensibly by those who were stationed on the same side with the machine; part of the electric fire having gone from the wire down the moist stones of the bridge, thereby making several shorter circuits to the phial, but still all passing through the gentlemen who were stationed on the same side with the machine. This was, in a manner, demonstrated by some persons feeling a sensible shock in their arms and feet, who only happened to touch the wire at the time of one of the discharges, when they were standing upon the wet steps which led to the river. In one of the discharges made upon this occasion, spirits were kindled by the fire which had gone through the river.

Upon this, and the subsequent occasions, the gentlemen made use of wires in preference to chains; for this, among other reasons, that the electricity which was conducted by chains was not so strong as that which was conducted by wires. This, as they well observed, was occasioned by the junctures of the links not being sufficiently close, as appeared by the snapping and flashing at every juncture where there was the least separation. The lesser snappings, being numerous in the whole length of a chain, very sensibly lessened the great discharge at the gun-barrel.

Their next attempt was to force the electrical shock to make a circuit of two miles, at the New River at Stoke Newington. This they performed on the 24th of July 1747, at two places; at one of which the distance by land was 600 feet, and by water 8000. The disposition of the apparatus was similar to what they before used at Westminster bridge, and the effect answered their utmost expectations. But as, in both cases, the observers at both extremities of the chain, which terminated in the water, felt the shock as well as when they stood between the rods fixed into the earth 20 feet from the water, as when they were put into the river; it occasioned a doubt, whether the electrical circuit was formed through the windings of the river, or a much shorter way, by the ground of the meadow: for the experiment plainly showed, that the meadow-ground, with the grass on it, conducted the electricity very well.

By subsequent experiments they were fully convinced, that the electricity had not in this case been conveyed by the water of the river, which was two miles in length, but by land, where the distance was only one mile; in which space, however, the electrical matter must necessarily have passed over the New River twice, have gone through several gravel pits and a large stubble field.

July 28th, they repeated the experiment at the same place, which the following variation of circumstances. The iron wire was, in its whole length, supported by dry sticks, and the observers stood upon original electricities; the effect of which was, that they felt the shock much more sensibly than when the conducting conductors had lain upon the ground, and when the observers had likewise stood upon the ground, as in the former experiment.

Afterwards, every thing else remaining as before, the observers were directed, instead of dipping their rods into the water, to put them into the ground, each 150 feet from the water. They were both instantly struck, though they were distant from each other above 500 feet.

The same gentlemen, pleased with the success of their former experiments, undertook another, the object of which was, to determine whether the electric virtue
virtue could be conveyed through dry ground; and, at the same time, to carry it through water to a greater distance than they had done before. For this purpose they pitched upon Highbury barn beyond Illyngton, where they carried it into execution on the 5th of August 1747. They chose a station for their machine almost equally distant from two other stations for observers upon the New River; which were somewhere more than a mile asunder by land and two miles by water. They had found the streets of London, when dry, to conduct very strongly for about 40 yards; and the dry road at Newington about the same distance. The event of this trial answered their expectations. The electric fire made the circuit of the machine, when both the wires and the observers were supported upon original electries, and the rods dipped into the river. They also both felt the shock, when one of the observers was placed in a dry gravelly pit, about 300 yards nearer the machine than the former station, and 100 yards distant from the river: from which the gentlemen were satisfied, that the dry gravelly ground had conducted the electricity as strongly as water.

From the shocks which the observers received in their bodies, when the electric power was conducted upon dry sticks, they were of opinion, that, from the difference of distance plainly considered, the force of the shock, as far as they had yet experienced, was very little. When they had performed, in support of nature, upon electries, and touched the water or the ground with the iron rods, the shock was always felt in their arms or wrists; when they stood upon the ground with their iron rods, they felt the shock in their elbows, wrists, and ankles; and when they stood upon the ground without rods, the shock was always felt in the elbow and wrist of that hand which held the conducting wire, and in both ankles.

The last attempt of this kind which these gentlemen made, and which required all their sagacity and address in the conduct of it, was to try whether the electric shock was perceptible at twice the distance to which they had hitherto carried it. In support of nature, the wires, and the rods dipped into the river. They also both felt the shock, when one of the observers was placed in a dry gravelly pit, about 300 yards nearer the machine than the former station, and 100 yards distant from the river: from which the gentlemen were satisfied, that the dry gravelly ground had conducted the electricity as strongly as water.

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between the two approaching parts: for, on making the discharge with only this addition in the apparatus, the small wire will hardly be made red hot; whereas, if the large wire be cut so as to discontinue the circuit, the small wire will be melted, and even exploded, by the same shock that before made it scarcely red hot. But though we can easily show that the electric fluid always meets with resistance, it is by no means easy to show why the same resistance which puts a temporary stop to its motions in some cases, doth not so in all.

Another curious experiment in electricity is the converting of conducting substances into electrics by cold, and of changing electrics into conductors by heat. The first hath yet been done only in the instance of water. This is a discovery of Mr. Achard's at Berlin, who, in the month of January 1776, observed, that water frozen to the 20th degree below the freezing point of Reaumur's thermometer, answering to the 13th below 0 of Fahrenheit's, is an electric. He tried his experiments in the open air, where he found, that a rod of ice two feet long and two inches thick, was a very imperfect conductor when Reaumur's thermometer was at six degrees below 0; and that it would not in the least conduct when the thermometer was sunk to 20°. By whirling a spheroid of ice in a proper machine, he even electrified the prime conductor so as to attract, repel, give sparks, &c. The ice made use of was free from air-bubbles, and pure transparent, to produce which, he used to let a vessel containing distilled water be frozen, upon the window of a room which was rather warm with respect to the ambient air; so that the water began to freeze on the one side of the vessel, while on the other it was still liquid.

To prove that glasses and other electrics become conductors when very hot: Take a small glass tube of about one twentieth of an inch in diameter, and above a foot long; close it at one end, and introduce a wire into it, so that it may be extended through its whole length; let two or three inches of this wire project above the open end of the tube, and the rest fall into the tube, and some inches beyond; tie round the closed end of the tube another wire, which will be separated from the wire within the tube only by the glass interposed between them. In these circumstances, endeavour to send a shock through the two wires, i.e. the wire inserted in the glass tube and that tied on its outside, by connecting one of them with the outside, and touching the other with the knob of a charged jar; and you will find that the discharge cannot be made unless the tube be broken; because the circuit is interrupted by the glass at the end of the tube, which is interposed between the two wires. But put that end of the tube to which the wire is tied into the fire, so that it may become just red-hot, then endeavour to discharge the jar again through the wires, and you will find that the explosion will be fairly transmitted from wire to wire through the substance of the glass, which, by being made red-hot, is become a conductor.

In order to ascertain the conducting quality of hot resinous substances, oils, &c. bend a glass tube in the form of an arch $CEF$, fig. 77. Plate CLXXXVII; and tie a silk drig $GCD$ to it, which serves to hold it by when it is to be set near the fire; fill the middle part of this tube with rosin, sealing-wax, &c. and then introduce two wires $AE$, $BF$, through its ends, so that they may touch the rosin, or penetrate a little way in it. This done, let a person hold the tube over a clear fire, so as to melt the rosin within it; at the same time, by connecting one of the wires $A$ or $B$ with the outside of a charged jar, and touching the other with the knob of the jar, endeavour to make the discharge through the rosin, and you will observe, that while the rosin is cold, no shocks can be transmitted through it; but it becomes a conductor according as it melts; and when totally melted, then the shocks will pass through it very freely.

To show that hot air is a conductor, electrify one of the cork-ball electrometers suspended upon the stand, fig. 7, of Plate CLXXIV, or electrify the prime conductor with the quadrant electrometer; then bring a red-hot iron within a sufficient distance of the electrometer or prime conductor, and you will find that they soon loose their electricity, which is certainly conducted by the hot air contiguous to the iron; for if the experiment be repeated with the same iron when cold, i.e. by bringing it within the same distance of the electrified electrometer or prime conductor, their electricity will not be conducted away as before. It has been observed, that a battery may be discharged by introducing a red-hot iron between two knobs interposed, and standing at some distance from each other in the circuit; but if, instead of iron, there be introduced a piece of red-hot glass between the knobs (the distance between them remaining as at first), the battery cannot be discharged: whence we may infer, that either hot air is not so good a conductor as has been imagined; or else, that air heated by iron is stronger with respect to its conducting power, than when heated by the red-hot glass.

The impossibility of forcing the electric fluid through a perfect vacuum, is a doctrine which militates against the theory laid down in Sect. VI. that we cannot by any means omit a very full consideration of it. As this, however, would lead us here into a theoretical discussion, we shall not enter into any explanation in this place, but defer what is to be said on that subject to the last section, where the use of the electric fluid in the system of nature are considered. The experiment on which this supposition is founded, was originally made by Mr. Wallis; who found it was possible to cleanse a barometrical tube so perfectly of air, that no electric light would be visible in it upon agitating the mercury, as is the case with the common barometers. It has since been repeated to more advantage by Mr. William Morgan, who from his observations has deduced some conclusions concerning the action of the electric fluid very conformable with that extensive operation which many philosophers have ascribed to it, and which is ascribed to it in various articles of this work. His experiment is published in the Phil. Trans. for 1785, which we shall here extract.

"The non-conducting power of a perfect vacuum, is a fact in electricity which has been much controverted among philosophers. The experiments made by Mr. Wallis, F. R. S. in the double barometer tube clearly demonstrated the impermeability of the electric light through a vacuum; nor was it, I think, precipitate..."
to conclude from them the impermeability of the electric fluid itself. But this conclusion has not been universally admitted; and the following experiments were made with the view of determining its truth or fallacy. When I first attended to the subject, I was not aware that any other attempts had been made besides those of Mr. Wallis; and though I have since found myself to have been in part anticipated in one of my experiments, it may not perhaps be improper to give some account of them, as they are an additional testimony in support of this fact, but as they led to the observation of some phenomena which appear to be new and interesting.

A mercurial gage $B$, about 15 inches long, carefully and accurately bored till every particle of air was expelled from the inside, was coated with tin-foil five inches down from its sealed end $A$, and being inverted into mercury through a perforation $D$, in the brass cap $E$, which covered the mouth of the cistern $H$, the whole was cemented together, and the air was exhausted from the inside of the cistern thro' a valve $C$ in the brass cap $F$ just mentioned; which producing a perfect vacuum in the gage, afforded an instrument peculiarly well adapted for experiments of this kind. Things being thus adjusted, (a small wire $F$ having been previously fixed on the inside of the cistern to form a communication between the brass cap $E$ and the mercury $C$, into which the gage was inverted), the coated end was applied to the conductor of an electrical machine; and notwithstanding every effort, neither the smallest ray of light, nor the slightest charge, could ever be procured in this exhausted gage. I need not observe, that if the vacuum on its inside had been a conductor of electricity, the latter at least must have taken place; for it is well known, that if a glass tube be exhausted by an air-pump, and coated on the outside, both light and a charge may very readily be procured. If the mercury in the gage be imperfectly boiled, the experiment will not succeed; but the colour of the electric light, which, in air rarefied by an exhaustor, is always violet or purple, appears in this case of a beautiful green; and what is very curious, the degree of the air's rarefaction may be nearly determined by this means. I have known instances, during the course of these experiments, where a small particle of air having found its way into the tube $B$, the electric light became visible, and as usual of a green colour; but the charge being often repeated, the gage has at length crackled at its sealed end, and in consequence the external air, by being admitted into the inside, has gradually produced a change in the electric light from green to blue, from blue to indigo, and so on to violet and purple, till the medium has at last become so dense as no longer to be a conductor of electricity. I think there can be little doubt from the above experiments, of the non-conducting power of a perfect vacuum; and this fact is still more strongly confirmed by the phenomena which appear upon the admittance of a very minute particle of air into the inside of the gage. In this case the whole becomes immediately luminous upon the slightest application of electricity, and a charge takes place, which continues to grow more and more powerful in proportion as fresh air is admitted, till the density of the conducting medium arrives at its maximum, which it always does when the colour of the electric light is indigo or violet. Under these circumstances the charge may be so far interested as frequently to break the glass. In some tubes which have not been completely boiled, I have observed that they will not condense the electric fluid when the mercury is fallen very low in them; yet upon letting in air into the cistern, so that the mercury shall rise in the gage, the electric fluid, which was before latent in the inside, shall now become visible; and as the mercury continues to rise, and of consequence the medium is rendered less rare, the light shall grow more and more visible, and the gage shall at last be charged, notwithstanding it has not been near an electrical machine for two or three days. This seems to prove, that there is a limit even in the rarefaction of air, which sets bounds to its conducting power; or, in other words, that the particles of air may be so far separated from each other as no longer to be able to transmit the electric fluid; that if they are brought within a certain distance of each other, their conducting power begins, and continually increases till their approach also arrives at its limit, when the particles again become near enough as to restit the passage of the fluid entirely, without employing violence, which is the case in common and condensed air, but more particularly in the latter.

It is surprising to observe how readily an exhausted tube is charged with electricity. By placing it at 10 or 12 inches from the conductor, the light may be seen pervading its inside, and as strong a charge may sometimes be procured as if it were in contact with the conductor; nor does it signify how narrow the bore of the glass may be; for even a thermometer tube, having a minute perforation possible, will charge with the utmost facility; and in this experiment the phenomena are peculiarly beautiful.

Let one end of a thermometer tube be sealed hermetically; let the other end be cemented into a brass cap with a valve, or into a brass cock, so that it may be fitted to the plate of an air-pump. When it is exhausted, let the sealed end be applied to the conductor of an electrical machine, while the other end is either held in the hand or connected to the floor. Upon the flight of the charge, the electric fluid will accumulate at the sealed end, and be discharged through the inside in the form of a spark, and this accumulation and discharge may be incessantly repeated till the tube is broken. By this means I have had a spark 42 inches long; and had I been provided with a proper tube, I do not doubt but that I might have had a spark of four times that length. If, instead of the sealed end, a bulb be blown at that extremity of the tube, the electric light will fill the whole of that bulb, and then pass through the tube in the form of a brilliant spark, as in the foregoing experiment; but in this case I have tubes of different sizes, from which I have been able to repeat the trials above three or four times by means of the electric machine and that the charge has made a small perforation in the bulb. If, again, a thermometer filled with mercury be inverted into a cistern, and the air exhausted in the manner I have described for making the experiment with the gage, a Torricellian vacuum will be produced; and now the electric light in the bulb, as well as the spark in the tube, will be of a vivid green; but the bulb will not bear a frequent repetition of charges before it is perforated in like manner as when it has been exhausted by an air-pump. It can hardly be
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M. Selkirk's experiments.

135 Why the fluid satisfies the form of a spark.

It is necessary to observe, that in these cases the electric fluid assumes the appearance of a spark (p), from the narrowness of the passage through which it forces its way. If a tube 40 inches long be fixed into a globe 8 or 9 inches in diameter, and the whole be exhausted, the electric fluid, after passing in the form of a brilliant spark throughout the length of the tube, will, when it gets into the inside of the globe, expand itself in all directions, entirely filling it with a violet and purple light, and exhibiting a striking instance of the vast elasticity of the electric fluid.

"I cannot conclude this paper without acknowledging my obligations to the ingenious Mr Brook of Norwich, who by communicating to me his method of boiling mercury, has been the chief cause of my success in these experiments (s). I have lately learned from him, that he has also ascertained the non-conducting power of a perfect vacuum; but what steps he took for that purpose, I know not. Of his accuracy, however, I am so well convinced, that had I never made an experiment myself, I should, upon his testimony alone, have been equally assured of the fact.

To most of the preceding experiments Dr Price, Mr Lane, and some others of my friends, have been eye-witnesses, and I believe that they were as thoroughly satisfied with myself as with the results of them. I must beg leave to observe to those who with to repeat them, that the first experiment requires some nicety, and no inconsiderable degree of labour and patience. I have boiled many gages for several hours together without success, and was for some time disposed to believe the contrary of what I am now convinced to be the truth. Indeed, if we reason \textit{a priori}, I think we cannot suppose a perfect vacuum to be a perfect conductor without supposing an absurdity: for if this were the case, either our atmosphere must have long ago been deprived of all its electric fluid, by being everywhere surrounded by a boundless conductor, or this fluid must pervade every part of infinite space, and consequently there can be no such thing as a perfect vacuum in the universe. If, on the contrary, the truth of the preceding experiments be admitted, it will follow, that the conducting power of one atmosphere increases only to a certain height, beyond which this power begins to diminish, till at last it entirely vanishes; but in what part of the upper regions of the air these limits are placed, I will not presume to determine. It would not perhaps have been difficult to have applied the results of some of these experiments to the explanation of meteors, which are probably owing to an accumulation of electricity. It is not, however, my present design to give loose to my imagination. I am sensible, that by indulging it too freely, much harm is done to real knowledge; and therefore, that one fact in philosophy well ascertained, is more to be valued than whole volumes of speculative hypotheses."

A fact so contrary to the generally received opinion of the conducting powers of a vacuum, could not but excite a general surprise, and attempts to repeat the experiment would no doubt be ardentely wished for. Unfortunately, however, the experiment itself, as must evidently appear from the account given of it by Mr Morgan, is of such a precarious nature, as must undoubtedly discourage any ordinary electrician from attempting it; for in the first place, there is no hope of success without a very tedious boiling of mercury in a tube for several hours; and even when this is done, the instrument will not remain in a state of perfection for any length of time. Mr Cavalo, who has greatly improved the air-pump, gives an account of some very curious experiments made with this instrument, in order to ascertain the truth of Mr Morgan's position; which we shall likewise give in his own words, with the conclusions he draws from them.

"In a glass receiver, of six inches diameter and nine inches in height, having a brass cap, a brass wire of two-tenths of an inch in diameter was fixed to its cap, and proceeding through the middle of the receiver, its lower extremity was five inches distant from the aperture of the receiver, and of course of the plate of"
A fine linen thread was "It appearing to be under the receiver, a very sensible,..."
air is more and more rarefied; and by following the law, we may perhaps conclude with F. Beccaria, that the electric attraction, when the air is more rarefied, is more perfect in a vacuum; though this will perhaps be impossible to be verified experimentally; because when in an exhausted vacuum receiver no attraction or repulsion is observed between bodies to which electricity is communicated, it will be only suspected, that those bodies are not sufficiently small and light. But if we consult reason, and which alone ought to assist us when decisive experiments are not practicable, it seems likely that electric attraction and repulsion cannot take place in a perfect vacuum, by which I only mean a perfect absence of air; because either this vacuum is a conductor or a non-conductor of electricity. If a conductor, and nearer to perfection as it becomes more free from air, it must be a perfect conductor at the same time that it becomes a perfect vacuum; in which case electric attraction or repulsion cannot take place amongst bodies included in it: for, according to every notion we have of electricity, those motions indicate or are the consequence of the intervening space in some measure obstructing the free passage of the electric fluid. And if the perfect vacuum is a perfect non-conductor, then either electric attraction nor repulsion can happen in it.

IV. In my former experiments, having always observed the electric light in the receiver of the air-pump, even when the air was rarefied to the utmost power of that machine, I thought proper to repeat that experiment with receivers of various sizes; and accordingly have used receivers of two feet in height, and some of as large a diameter as the plate of the pump could admit, which is about 14 inches; but the light in it was always visible, only with different colours in different degrees of exhaustion, and always more diffused, and at the same time less dense, when the air was more rarefied; which seems to render it probable, that when the air is quite removed from any space, the electric light is no longer visible in it, as must have been the case with the experiment of Mr. Wallih's double barometer; for it is a maxim very well established in electricity, that the electric light is only visible when the electric fluid, in passing from one body to another, meets with some opposition in its way; and according to this proposition, when the air is entirely removed from a given receiver, the electric fluid passing through that receiver cannot show any light, because it meets with no opposition; but this will not account for the receiver ever becoming a non-conductor.

Having just mentioned, that according as the air is more and more rarefied in a receiver, so the electric light becomes gradually more faint, it will be proper to add, that the electric light is more diffused and less bright in an exhausted receiver than in air: Thus, when the receiver is not exhausted, the discharge of a jar through some part of it will appear like a small globule exceedingly bright; but when the receiver is exhausted, the discharge of the same jar will fill the whole receiver with a very faint light; whereas some persons, by facing the whole receiver illuminated, are apt to say that the light of electricity is rendered stronger and greater by the exhaustion.

V. It is mentioned by Mr. Nairne, in the 67th vol. of the Phil. Trans. that having put a piece of leather, just as it comes from the leather-sellers, into the receiver of an air pump, and afterwards having rarefied the air in it 148 times, the electric light appeared very faint in it; whereas, without the leather, and even when the air was much more rarefied, the light of the electric fluid, when made to pass through the receiver, was much more apparent. In consequence of this observation, I suspected that a little moisture in the receiver, or some other effuvia of substances, might perhaps prevent the appearance of the electric light in rarefied air; and with this view I began to put various substances successively into the receiver; and after rarefying the air by working the pump, some electric fluid was made to pass through the receiver.

When a piece of moist leather was put in the receiver, the air could not be rarefied above 100 times, and the electric light appeared divided into a great many branches; though at the same time another fort of faint light filled up the whole cavity of the receiver.

When a linen rag, moistened with a mixture of spirit of wine and water, was put into the receiver, the pump could not exhaust above 40 times, and the light of electricity appeared divided into many branches.

A wine-glass full of olive oil placed under the receiver, prevented very little the exhaustion of the pump, the air being rarefied above 400 times. The electric light appeared exactly as it usually does in the same degree of rarefaction when no oil is under the receiver, viz. a uniform faint light inclining to purple or red.

Concentrated vitriolic acid placed in a glass under the receiver, produced no particular effect. As for the other mineral acids, they were not tried, because, being volatile, they would have damaged the pump.

Dry solids, that had a considerable smell, as sulphur, aromatic woods, which, when very dry, and some resins, produced no particular effect, any more than some of them prevented a very great degree of exhaustion, owing to some moisture which still adhered to them.

From these experiments it appears, first that in the utmost rarefaction that can be effected by the attraction and repulsion of electricity, the air in the perfect vacuum, can never assume a state which can be capable of pervading a perfect vacuum; and that the air, in the state of the atmosphere, is no more rarefied, and in the same manner the intensity of the light is gradually diminished. Now by reasoning on this analogy we may conclude, that both the attraction and the light will cease in a perfect absence of air: but this will never account for this perfect vacuum ever becoming a non-conductor of electricity; for since the electric fluid is very elastic, and expands itself with more and more freedom in proportion as the resistance of the air is removed, it seems unnatural that it should be incapable of pervading a perfect vacuum; however, the fact seems to be fully ascertained by Mr. Wallih and Mr. Morgan; and the only thing that remains to be done is to investigate the cause of so remarkable a property.
With regard to the power of the electric fluid, we have already had occasion to speak in various parts of this treatise, and particularly to mention the machine in Teyler's Museum at Haarlem, as that which was capable of accumulating the greatest quantity of electricity that had ever been done artificially. Some of the effects of this machine, without any battery, have already been described; and those which follow are equally calculated to give an idea of its vast power. A battery of 120 jars, containing among them about 150 square feet of coated surface, was charged by about 100 turns of the glass plates; the discharge of which melted an iron wire 15 feet long and \( \frac{1}{10} \) of an inch diameter; and another time they melted a wire of the same metal 25 feet long and \( \frac{1}{10} \) of an inch in diameter. With such an extraordinary power they tried to give polarity to needles made out of watch-springs of three and even six inches in length, and likewise to steel bars nine inches long, from a quarter to half an inch in breadth, and about the twelfth-part of an inch in thickness. The result was, that when the bar or needle was placed horizontally in the magnetic meridian, whichever way the shock entered, the end of the bar that stood towards the north acquired the north polarity, or the power of turning towards the north when freely suspended, and the opposite end acquired the south. If the bar, before it received the shock, had some polarity, and was placed with its poles contrary to the usual direction, then its natural polarity was always diminished, and often reversed; so that the extremity of it, which in receiving the shock looked towards the north, became the north pole, &c.

When a bar or needle was struck standing perpendicularly, its lowest end became the north pole in a caffee, even when the bar had some magnetism before, and was placed with the south pole downwards. All other circumstances being alike, the bars needed to acquire an equal degree of magnetic power, whether they were struck whilst standing horizontally in the magnetic meridian, or perpendicular to the horizon.

When a bar or needle was placed in the magnetic equator, whichever way the shock entered, it never gave it any magnetism; but if the shock was given through its width, then the needle acquired a considerable degree of magnetism, and the end of it which lay towards the west became the north pole, and the other end the south pole.

If a needle or bar, already magnetic, or a real magnet, was struck in any direction, its power was always diminished. For this experiment, they tried considerable large bars; one being 7,08 long, 0,96 broad, and 0,95 thick.

When the shock was so strong, in proportion to the size of the needle, as to render it hot, then the needle generally acquired no magnetism at all, or very little.

The experiments lastly tried with this very powerful battery were concerning the calcination of metallic substances, and the revivification of their calcines. It appears that the electric shock produced both these apparently contradictory effects.

The metallic calcines used in those experiments were of the purest sort; they were confined between glasses whilst the shock was passed over them. By this means the calcines were so far revivified as to exhibit several grains of the metal, large enough to be discerned by the naked eye, and to be easily separated from the metal.

As to the calcination of metals, whenever a shock was employed much greater than that which was necessary to fuse the metal, part of the metal was calcined, and dispersed into smoke. It is remarkable, that this calcination or smoke generally produced several filaments, of various lengths and thicknesses, which swam in the air. It was further observed, that those dying filaments of metallic calcine, if a conductor was presented to them, were soon attracted by it; but after the first contact, they were instantly repelled, and generally broke into diverse parts.

Even this vast power was not the utmost effect of the machine. Dr Van Marum, whom we have already mentioned as principally concerned in making the experiments, thinking that it was capable of charging a larger surface, added to it 90 jars, each of the same size with the former; so that his grand battery is now a square of 15 jars every way, and contains 225 square feet of coated glafs. To ascertain the degree of the charge, he uses the electrometer invented by Mr Brook, to be afterwards described, which is fixed in the centre of the battery, at the height of four feet above the knobs of the jars.

His first object was to try whether this battery could be fully charged by the machine, and whether its increase of power was proportional to the augmentation of its surface. In these respects, his expectations were fully answered. The former battery discharged itself over the uncoated part of the jars after 96 revolutions; and the present did the same after 160 turns of the machine. With the former battery, the Doctor had split a cylinder of box three inches in diameter and three inches in length, the section of which, through its axis, contained nine square inches. With the 225 jars, he split a similar cylinder, four inches in diameter and four inches in height, the section of which was 16 square inches. He found that to split a square inch of this wood in the same direction, required a force equal to 665 pounds; and hence calculates that the power of this explosion was not less than 9840 pounds.

The apparent resemblance between the effects of electricity and of fire, especially in melting metals, has led many to suppose that they act upon bodies in a similar manner. In order to examine whether this is the case, Mr Van Marum caused wires of different metals to be drawn through the same hole, and observed how many inches of each could be melted by the explosion of his battery; taking care, in all these experiments, to charge it to the same degree as ascertained by his electrometer. The results were as follow:

- Of lead he melted. - 120 inches.
- Of tin - 120.
- Of iron - 5.
- Of gold - 3\( \frac{1}{2} \).
- Of silver, copper, and brass, not quite a quarter of an inch.

These several lengths of wire, of the same diameter, melted by equal explosions, indicate, according to our author, the degree in which each metal is fusible by
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The electrical discharge, and if these be compared with the fusibility of the same metals by fire, a very considerable difference will be observed. According to the experiments of the academicians of Dijon, to melt tin required a heat of 172 degrees of Reaumur’s thermometer.

- Lead  -  -  -  230
- Silver -  -  -  420
- Gold   -  -  -  563
- Copper -  -  -  630
- Iron   -  -  -  690

Thus tin and lead appear to be equally fusible by electricity, but not by fire: and iron, which by fire is less fusible than gold, is much more so by the electrical explosion. From these and some other experiments of the same kind, Dr Van Marum concludes, that in melting metals, the electrical fluid acts upon them in a manner very different from the action of fire, and that the supposed analogy between these two powerful agents cannot be proved, either from the fusion of metals, or the ignition of combustible substances.

By these experiments on the fusibility of metals, Dr Van Marum was induced to make trial of the comparative efficacy of lead, iron, brass, and copper, as conductors to preserve buildings from lightning. In this respect, he found that a leaden conductor ought to be four times the size of one of iron, in order to be equal in point of safety. He has also fully proved the superiority of rods to chains, and of copper to iron, for this important use.

When iron wire is melted by the explosion of the battery, the red-hot globules are thrown to a very considerable distance, sometimes to that of 30 feet: this the Doctor justly ascribes to the lateral force exerted by the electrical fluid. It is, however, remarkable, that the thicker the wire is which is melted, the further are the globules dispersed; but this is accounted for, by observing, that the globules, formed by the fusion of thinner wires being smaller, are less able to overcome the resistance of the air, and are therefore sooner stopped in their motion.

Two pieces of iron wire being tied together, the fusion extended no further than from the end connected with the inside coating of the jars to the knot; the wire of the same length and thickness, when in one continued piece, had been entirely melted by an equal explosion.

When a wire was too long to be melted by the discharge of the battery, it was sometimes broken into several pieces, the extremities of which bore evident marks of fusion; and the effect of electricity in shortening wire was very sensible in an experiment made with 18 inches of iron wire of 1/16th of an inch in diameter, which, by one discharge, left a quarter of an inch of its length. An explosion of this battery through very small wires, of nearly the greatest length that could be melted by it, did not entirely discharge the jars. On transmitting the charge through 50 feet of iron wire of 1/16th of an inch diameter, the Doctor found that the residuum was sufficient to melt two feet of the same wire; but this residuum was much less when the wire was of too great a length to be melted by the first discharge. After an explosion of the battery through 180 feet of iron wire, of equal diameter with the former, the residuum was discharged through 12 inches of the same wire, which it did not melt, but only blued.

Twenty-four inches of leaden wire, 1/16th of an inch in diameter, were entirely calcined by an explosion of this battery; the greater part of the lead rose in a thick smoke, the remainder was struck down upon a paper laid beneath it, where it formed a tin, which resembled the painting of a very dark cloud. When shorter wires were calcined, the colours were more varied. A plate is given of the tin made by the calcination of eight inches of this wire, in which the cloud appears variously shaded with different tints of green, gray, and brown, in a manner of which no description can give an adequate idea.

On discharging the battery through eight inches of tin wire, 1/16th of an inch diameter, extended over a sheet of paper, a thick cloud of blue smoke arose, in which many calcareous filaments were discernible; at the same time a great number of red hot globules of tin, falling upon the paper, were repeatedly thrown up again into the air, and continued thus to rebound from its surface for several seconds. The paper was marked with yellowish cloudy films immediately under the wire, and with streaks or rays of the same colour issuing from it in every direction; for these forms an uninterrupted line, others were made up of separate spots. In order to be certain that the colour of these streaks was not caused by the paper being scorched, the experiment was several times repeated, when a plate of glass and a board covered with tin were placed to receive the globules. Thence, however, they stained exactly like the paper. On calcining five inches of the same kind of wire, the red-hot globules were thrown obliquely to the height of four feet, which afforded an opportunity of observing that each globule, in its course, diffused a matter like smoke, which continued to appear for a little while in the parabolic line described by its flight, forming a track in the air of about half an inch in breadth.

From this phenomenon, Dr Van Marum conjectured, that when the globules approach the paper on fire, which they fall, the matter issuing from their lower part strikes against its surface; and being elastic, forces them upwards again by its reaction. The cloudy film immediately under the wire, the Doctor attributes to the instantaneous calcination of its surface; whereas the remainder of the metal is melted into globules, which, while they retain their glowing heat, continue to be superficially calcined, and, during the process, part with this calcareous vapour.

Phenomena resembling the above were observed on the calcination of a wire of equal parts of tin and lead, eight inches long, and 1/16th of an inch in diameter. This also was melted into red globules, which were repeatedly driven upwards again from the paper on which they fell, and marked it with streaks of the same kind, but of a brown colour, edged with a yellow tinge. Some of these globules, though apparently molten hot, moved with less velocity than others, and were soon stopped in their course by their burning a hole in the paper. In this case, a yellow matter was seen to rise from their surface to the height of one or two lines, which extend itself to the width of a quarter of an inch. This matter continued, during
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Miscellaneous Experiments.

Five or six seconds, to issue from the globules, and formed on their surface, a kind of efflorescence, resembling the flowers of sulphur produced by the **saffafer**. The globules, from which these calcareous flowers had issued, were found to be entirely hollow, and to consist of only a thin shell. When this mixed metal is calcined with a lefs charge of the battery, it leaves a flaw upon the paper, something similar to that made by lead, and does not run into globules.

The Doctor has also given plates of the flaws made upon paper, by the calcination of iron, copper, brass, silver, and gold. Those made by copper and brass wires are remarkably beautiful, and are variegated with yellow, green, and a very bright brown, eight inches of gold-wire, 1/2 of an inch in diameter, were, by the explosion reduced to a purple substance, of which a part rose like a thick smoke, and the remainder, falling on the paper, left a stain diversified with different shades of this colour. Gold, silver, and copper, cannot easily be melted into globules. Our author has once accidentally succeeded in this; but it required a degree of electrical force so very particular, that the medium between a charge, which only broke the wire into pieces, and one which entirely calcined it, could not be ascertained by the electrometer.

The Doctor was convinced, by M. LaVoyler's experiments, that metals, calcined in atmospheric air, absorb from it that principle which renders it fit for respiration; yet he resolved further to investigate this point, by trying what would be the effect of a discharge of the battery through a piece of wire confined in phlogisticated air. For this purpose, he took air, in which a burning coal had been extinguished, and which had afterwards stood eight days upon water, that it might be entirely cleared from fixed air; with this he filled a glass cylinder, four inches in diameter, and six inches high, closed at the upper end with a brass plate; from the centre of this plate the wire was suspended; on which the experiment was made. The cylinder was set in a pewter dish filled with water; and to prevent its being broken by the expansion of the air, its lower edges were supported by two pieces of wood half an inch high. The lower end of the wire rested on the dish, which was connected with the outside coating of the battery.

On transmitting the charge, in this manner, through wires of lead, tin, and iron, of only half the length of those which were calcined by an equal explosion in atmospheric air, no calcination took place. The first was reduced to a fine powder, which, upon trial by spirit of nitre, appeared to be merely lead; the two other metals were melted into small globules. The Doctor then tried the same experiment in pure or phlogisticated air, obtained from red precipitate; thinking, that, in this, the metals would be more highly calcined than in common air. His expectation was answered only by the lead, which was entirely reduced to a yellow calx, perfectly resembling naphato. The other metals were not more highly calcined in this than in common air; but the globules of iron acquired so great a heat, as to retain it for some seconds, even in the water, and to melt holes in the pewter dish into which they fell.

In nitrous air, calcination took place as easily as in common or in dephlogisticated air. This was contrary to Dr Van Marum's expectation; but he accounts for it, by observing that, from the experiments of Mr Cavendish and of M. Lavoisier, pure air appears to be one of the component parts of the nitrous acid.

In order to illustrate M. Lavoisier's theory, Dr Van Phaenomena from the calcination of metals in water. This he tried with both iron and lead; and found that, in the moment of the explosion, a number of air-bubbles appeared on the surface, and the calx rose, like a cloud, through the water. This, he thinks, is not so easily accounted for by the theory of Stahl as by that of M. Lavoisier; because, according to the former, water does not readily either receive or part with phlogiston; whereas the latter supposes this fluid to be composed of the oxygenous principle, united with that of inflammable air. If this be true, nothing more is necessary to calcination, than that the metals should acquire a greater affinity with the oxygenous principle, that suffists between this and that of inflammable air, united with it in the composition of water. To collect the air generated by these calculations was no easy matter; as the violence of the shock broke the glass receivers employed for this purpose; at last, however, the Doctor contrived a method of receiving it in a glazed stone basin. From the first calcination of lead, about a quarter of a cubic inch of air was produced, which showed no signs of inflammableness: but, on every repetition of the experiment, a less quantity of air was generated; and on an accurate trial of that produced by the fourth calcination in the same water, it was found to consist of one part of inflammable and three of atmospheric air. Our author designs to repeat these experiments with water deprived of its air, by being boiled.

In order to imitate the phenomena of earthquakes, Phenomena of earthquakes, this ingenious philosopher followed Dr Priestley's method, and made the electrical explosion pass over a board, floating on water, on which several columns of water were erected; but this succeeded only once. Reflecting that the electric explosion exerts the greatest lateral force when it passes through imperfect conductors, and that water is probably its principal subterraneous conductor, he laid two smooth boards upon each other, moistening the sides in contact with water: upon the uppermost, he placed pieces of wood, in imitation of buildings, the bases of which were 3 inches long and 1/2 broad. When the charge of the battery was transmitted between the boards, all these were thrown down by the tremulous and undulatory motion of that on which they stood.

Mr Brookes, electrician at Norwich, has made a great number of experiments, with a view to determine exactly the force of batteries of an inferior size in melting fine wires of different kinds. In these he was particularly careful to ascertain the degree to which his batteries were charged; and this he did by the method which shall afterwards be shown to be the best, viz. that of determining the power of the electricity by the weight which it was capable of raising by irresistible power; and therefore, in the following experiments, the phrase of batteries being charged to so many grains, implies that the repulsive power of the knob of the battery was able to raise that weight.
Some of the most remarkable of these experiments were as follow:

1. With a battery of nine bottles, containing about 16 square feet of coated surface, charged to 32 grains of repulsion, which charge was sent through a piece of steel wire 12 inches long and \( \frac{2}{3} \) th of an inch thick 11 times; the wire was shortened one inch and a half, being then about ten inches and an half long; the 12th time the wire was melted to pieces.

2. A charge, with the same nine bottles, to 32 grains of repulsion, being sent through a piece of steel wire 12 inches long and \( \frac{2}{3} \) th of an inch thick, the first time melted the whole of it into small globules.

3. A charge of the same nine bottles charged to 32 grains, being sent through a piece of steel wire 12 inches long, \( \frac{2}{3} \) th of an inch thick, the whole of it was melted, with much smoke, almost like gunpowder; but the metallic part of it, after it was melted, formed itself, in cooling, chiefly into concave hemispherical figures of various sizes.

4. With only eight of the above bottles charged to 32 grains, the charge did but just melt 12 inches of the steel wire \( \frac{2}{3} \) th of an inch thick, so as to fall into several pieces; which pieces in cooling formed themselves into oblong lumps joining to each other by a very small part of the wire between each lump, which was not melted enough to separate, but appeared like oblong beads on a thread at different distances.

5. The same eight bottles charged to 32 grains, so perfectly heated 12 inches of brass wire, about \( \frac{2}{3} \) th of an inch thick, as to melt it, or soften it enough for it to fall down by its own weight (from the forceps with which it was held at each end) upon a sheet of paper placed under to catch it; and when it fell down, it was so perfectly flexible, that by falling, it formed itself into a bent or nearly vermicular shape, and remained entire its whole length, i.e., about 12 inches when it was put into the forceps; but after it was fallen on the paper, it flagged so much as to be stretched by its own weight from 12 to about 15 inches long; and by falling on the paper it flattened itself the whole length of it, so that when it was examined with an half inch magnifier, it appeared about five or six times broader than it was in thickness.

6. With nine bottles again, charged only to 20 grains, the charge was sent through 12 inches of steel wire \( \frac{2}{3} \) th of an inch thick, which heated it enough to melt it so as to be separated in many places; and the pieces formed themselves into string-bead-like shapes, as in experiment 4.

7. With the same nine bottles, charged to 20 grains, the charge was sent through 10 inches of brass wire \( \frac{2}{3} \) th of an inch thick; the wire was heated to red hot as to be very flexible, yet it did not separate, but was shortened near \( \frac{2}{3} \) th of an inch.

8. A charge of nine bottles, charged to 20 grains, sent a second time through the last piece of wire, melted it altogether in three places.

9. Nine bottles charged to 30 grains, and the charge sent through 12 inches of brass wire \( \frac{2}{3} \) th of an inch thick, treated it nearly as in experiment 5, except that it was separated in two places, and the pieces measured about 16 inches and an half.

10. Nine bottles charged to 30 grains, and the charge being sent through eight inches and a half of brass wire the size of the latter, wholly dispersed it in smoke, and left nothing remaining to fall on the fleet of paper placed under it.

11. With 12 bottles, charged to 20 grains, the charge was sent through ten inches of steel wire one-hundredth of an inch thick, which made the wire red hot, but did not melt it.

12. A second charge, the same as the last, was sent through the same piece of wire, which heated it red hot as the first did, but it was not separated; this piece of wire was now shortened five-sixteenths of an inch.

13. A charge to 25 grains, with the same 12 bottles, was sent through the last piece of wire which melted it into many pieces, and many globules of calcined metal.

14. A charge of 15 bottles, charged to 25 grains, was sent through ten inches of steel wire one-hundredth of an inch thick, which melted it the first time, and dispersed a great part of it about the room.

15. A charge with the last 15 bottles, charged to 23 grains, just melted the last inch of steel wire the size of the former, so as to run into beautiful globules, nearly as in exp. 13.

16. A charge of 15 bottles, charged to 15 grains, being sent through ten inches of steel wire the size of the latter, it barely made red hot; but it was shortened one-tenth of an inch by the stroke passing through it.

17. The last piece of wire having a charge of 15 bottles, charged to twelve and a half grains, sent through it, was not made red hot.

18. A charge of the same 15 bottles, charged to 25 grains, was sent through the same piece of wire, which seemingly tore the wire into splinters.

19. Four bottles, charged to 30 grains, just melted three inches of steel wire one hundred and sevenieth of an inch thick, so as to fall into pieces.

20. Five bottles, charged to 25 grains, most beautifully melted three inches of such wire as the last into large globules.

21. Eight bottles, charged to 15 grains, melted three inches of steel wire one hundred and seventieth of an inch thick, similar to the five in the last experiment; so nearly alike both in appearance and effect, that it might have been said to be the same.

22. Ten bottles charged to twelve and a half grains, rather exceeded exp. 19, but scarcely came up to exp. 20 and 21.

23. Suspecting something in exp. 19. I found, that though my bottles hitherto were as nearly of the same size as I could procure them, yet some of them were a little larger than others, and which was the case in exp. 19, one of the four was smaller than the other three; so that I repeated the experiment with four bottles more equal in size, and charged them to 30 grains, and the fusion was as perfect as in any.

24. A charge to 20 grains, with the last eight bottles, very finely melted six inches of steel wire one hundred and sevenieth of an inch thick.
25. With two bottles, charged to 45 grains, the wire was through one inch of such sized steel wire as the leaf, which only charged its coating.

27. Three bottles, with a 40 grains charge, differed one inch and a half of steel wire, the size of the leaf, all about the room.

29. As a steel wire of one hundredth of an inch thick has nearly double the quantity of metal of a wire one hundred and seventieth of an inch thick, so I took three inches of the former, and sent a 25 grains charge with ten bottles through it, which melted it just as the five bottles did in exp. 20.

31. The same 48 feet, negatively charged to a little more than four grains, upon six inches of steel wire, the size of the leaf; but this was only made very faintly red.

32. A repetition of the last experiment with the same length of the same wire, to see how often the same charge might be sent through before it would be melted, and to observe the appearance of the wires after each stroke; the eighth stroke melted it into several pieces.

33. Repeating exp. 31, again with the same size and length of wire, and the same battery charged the same, in order to observe the method of the wire shortening, having fixed an insulated gage parallel to and a quarter of an inch distance from it; after the first stroke, which made the wire fairly red, (it being fixed at one end, that the shortening might appear all at the other, which was held so as either to contract or dilate), I observed that it shortened considerably as it cooled; repeating the stroke, it did the same, and on till it was melted, which was by the eighth stroke, as before. At the instant that the stroke passed through the wire it appeared to dilate a little, and after it was at its hottest, it gradually contracted after every stroke as it cooled, about one-sixteenth of an inch each time; the dilating was so very little, as to bear but a very small proportion to its contraction, and sometimes it was doubtful whether or not it did dilate at all; but after all the observations it appeared oftener as if it did dilate, than as if it did not.

34. The fame 48 feet, negatively charged to a little more than four grains, melted three inches of steel wire one-hundredth of an inch thick, the fame as the positive charge did in exp. 30.

35. The same battery of 48 feet of coated surface, charged to a little more than eight grains, melted three inches of steel wire one-hundredth of an inch thick. This is very nearly in proportion to exp. 27. but here the charge was negative, and the fusion was the most pleasing of any I have hitherto had; probably owing to the charge, by chance, happening to be so well adjusted as to be exactly sufficient to melt the wire and no more; it held hot the longest, and the fused metal ran into the largest globules: probably the
length of the time that the heat continued, was owing to the charge being just sufficient, and to the size of the lumps that the fused metal formed itself into.

"36. A repetition of exp. 1. with twelve inches of steel wire, one-hundredth of an inch thick, but with this difference, that as then I used only nine bottles, containing about 16 square feet of coated-surface charged to 32 grains, I here used 18 bottles containing about 32 square feet of coating charged to only 16 grains. This was done, to observe the progress of the destruction of the wire, as in exp. 32, as well as to prove the similarity of the effect. The wire being the same size, sort of metal, and length, as recited just above; the first stroke made it fairly red-hot the whole length of it with smoke and smell, changed its colour to a kind of copperish hue, and shortened it considerably; the second stroke made it of a fine blue, but it did not appear red, and shortened more; at the third stroke, it became zigzagged, many radii were very visible at the bendings, and continued to shorten till the eleventh stroke, when one of the bottles in the second row of the battery was struck through; the fracture was covered over with common cement, its place supplied by changing place with one in the third row, supposing the mended one to be the twentieth of an inch thick; seven times, made it zigzag through.

For a charge of 48 feet to eight grains, being melted by electricity, I proceeded to show it them, by fixing 12 inches of steel wire one-hundred and seventeenth of an inch thick, in the forceps, and then supposing the electrometer and all other things ready placed to charge the battery, but the electrometer did not move; nevertheless, I continued charging as I supposed; but still the electrometer remained as it was, although I had been charging much longer than would have been necessary, contrary to my design, which was to take a small wire, that a small charge might be sufficient. Having been charging a long time, I left off to look about the apparatus, in order to see if anything was not right: as I was looking, I found there was no communication to the electrometer, and heard a small crackling in the battery, which convinced me that it was charged. Accordingly I made the discharge, expecting nothing unusual; but the wire was disappointed seemingly in a very violent manner. The report was so very loud that our ears were stunned, and the flash of light so very great, that my sight was quite confused for a few seconds. The singularity of the appearances attending this experiment led me to infer it."

Though from what has been said under section VI. the direction of the electric fluid onwards from a body positively electrified, and onwards from one negatively so, seems to be sufficiently ascertained, yet there are experiments related by Mr Nicholison in the last volume of the Philosophical Transactions, which seem to militate against this doctrine, require a particular consideration; and for this reason we shall here not only give an account of these, but of some others made on the subject of excitation, and the state of a charged phial in general, which seem to throw some light upon the subject. Mr Milner, who has been at great pains to inquire into this matter, makes the following observations:

"1. In the charged phial, when the inside has electric lightnings, a phial of the Leyden kind of electricity communicated to it, the outside is found to posset a contrary power. It appears also from the preceding experiments, that either kind of electricity always produces the other on any conducting substance placed within the sphere of influence. And as the same effect is also produced on electrics themselves, in the same situation, and as some portion of the air, supposing no other substance to be near enough, must be unavoidably exposed to such influence, it necessarily follows, that neither power can exist without the other; and therefore, in every possible case, positive
positive and negative electricity are inseparably united.

"II. A phial cannot be fully charged, by which the outside acquires a contrary electricity, unless the external coating has a communication by some conductor with the earth. In the same manner, a full charge of the contrary electricity cannot readily be procured in these experiments without a similar communication.

"III. In both cases the interpolation of an electric body between the contrary powers is absolutely necessary. In one case that body is glass, in the other it is air; and the experiment will not succeed in either, unless both the glass and the air be tolerably free from moisture.

"IV. It appears from the 18th experiment, that the influence of electricity acts in the same manner through glass as it does through the air, and produces a contrary power in both cases.

"V. A communication of the electric matter is more easily made through the fluid than through glass; whereas it is so hard and solid a body, as to require a very considerable degree of power to separate its component particles; this, however, sometimes happens, and a hole is made through the glass itself, without design, in attempting to charge a very thin phial as high as possible, in the most favourable state of the atmosphere.

"VI. A conducting body receives the strongest charge of the contrary electricity, in these experiments when it is brought as near as possible to the electric power, without being within the communicating distance. And it is well known that the thinnest phial, if it be strong enough to prevent a communication between the two surfaces, will always receive the highest charge.

"VII. The electricity of the external surface of the charged phial cannot be destroyed, so long as the internal surface remains in force, and continues to exert its influence through the glass; because this influence was the cause of the contrary electricity on the external surface, and must therefore prevent it.

"VIII. If part of the course which the electric matter takes in discharging a phial be through the air, a small part of the charge will always remain; because the whole of the redundancy on one surface is not capable of forcing a passage through the resisting medium of the air, in order to supply the deficiency on the other surface. But if every part of the circuit from the internal to the external coating, consists of the best conductors, and if the coated surfaces be nearly equal, and directly opposite to each other, the phial will then appear to have retained no part of the charge, so far as it is covered with tin-foil; but the parts of it above the coating on both sides will, however, still retain the contrary electricities, after the circuit has been completed (o). A residue of the charge may also be observed in every other instance of electrification, in which the degree of electricity is sufficient to force a communication between the electrified body and a conductor not insulated, through a small portion of the air: and if the experiment be carefully made, it will appear, that the whole of the redundancy is not capable of passing through the retarding intermediate air, in any case, and therefore a part of the charge must always remain. This may be conveniently shown by using a well excited electrophorus of about five inches diameter, the metal cover of which may be so strongly electrified, as to force a communication through the air, to any good conductor not insulated, at the distance of three quarters of an inch. After this, a second communication much weaker than the first may be made at the distance of about the twentieth-part of an inch, which is the residue of the charge, or rather a part of it: for if the second communication be carefully made through the air, without touching the cover, it will be found that it has retained enough of the first charge to electrify a pair of vertical needles.

"As it appears from this view, that both these cases are similar in so many remarkable particulars, it follows, that they are essentially the same, notwithstanding they differ in the degree of power and some other circumstances, which may alter the form of an experiment without changing its nature. It is apprehended, therefore, that the above-mentioned distinction will not only appear to be unnecessary, but also that either power cannot possibly exist without the other, as it has been shown under the first particular, that positive and negative electricity were inseparably united. But here it will be proper to examine more particularly the nature of charged glasses.

"1. When a plate of coated glass has been charged and the circuit between the coatings has been completed, by the mediation of a good conducting substance, no part of the coated surface is supposed to retain any part of the charge; but, according to the commonly received doctrine, the whole of it is said to be discharged; or in other words, to be brought into its natural state. This, however, is not really the case, as will evidently appear from the following experiment; the design of which is to show the effects produced by charging and discharging a plate of glass."

"2. Let the middle of a piece of crown window-glass, seven inches square, be placed between two circular plates of brass, about the 16th part of an inch thick, and five inches in diameter. In order to enable these plates to retain a greater degree of power, it will be proper to terminate each of them with a round bead the third part of an inch thick; and the whole of the bead should be formed on one side of the plate, that the other side may remain quite flat, and apply well to the surface of the glass. Let the whole be insulated.

(o) The whole remainder of the charged phial must not, however, be ascribed to the cause above-mentioned: for after taking away that part of it belonging to the coated surface, which could not force a passage through the air, if the phial had been allowed to stand a short time on the table, the coated surface would again gradually acquire some power, which must be derived from the charge of the phial above the coating. Another source of the residuum will appear in the next experiment."
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Sect. IX.

Mifcellaneous Experiments.

Let a like insulating flexible wire be formed into an hook, that it may be removed at any time by the assistance of a silk string, without destroying the inflation of the plate.

3. The glafs being thus coated with metal on both sides, and having also a proper communication with the table, will admit of being charged; and both coatings may be separated from the glafs, and examined apart, without destroying the inflation of either; for the upper coating may be separated by the means of its own proper item; and the under coating may be separated by taking hold of the corners of the glafs, and lifting the glafs itself. As glafs readily attracts moisture from the atmosphere, it will therefore be necessary to warm it in the beginning, and to repeat it several times in the course of the experiment, unless the air should be very dry.

4. Excite a smooth glafs tube, of the common size, by rubbing it with silk, and apply it repeatedly to the bent wire until the glafs be well charged. Then remove the chain, which reaches from the lower plate to the table, and also the charging wire from the upper plate, by laying hold of its hook with a silk string. It necessarily follows, from considering the quality of the power employed in the present case, that the upper surface of the glafs, together with the upper coating, must be electrified positively; and that the under surface and coating must be electrified negatively; but as it is designed in this experiment to examine the powers of charged glafs, that no virtue may be imputed to the glafs but what really belongs to it, let both coatings be separated from it; and after they have been brought to their natural state, by touching them with a conducting body not insulated, let the glafs be replaced between them; and whatever effects may now be produced, must be ascribed solely to the powers of the charged glafs. On bringing a finger near the upper coating, a small electrical spark will appear between that coating and the finger, attended with a snapping noise. Apply a finger in the same manner to the under coating; and the same thing will happen. This effect cannot be produced twice, by two succeeding applications to the same coating; but it may be repeated several hundred times over, in a favourable state of the atmosphere, by alternate applications to the two coatings; and the powers of the glafs will be thus gradually weakened.

5. This part of the experiment may be explained, by observing, that the contrary electricity has a natural tendency to produce, and to preserve each other, on the opposite sides of a plate of glafs; and therefore, the increase or decrease of power, on either surface, must be regulated by the increase or decrease of the contrary power on the other side; and as in charging a plate of glafs positively, no gradual addition of electric matter can be made to the upper surface, with-
only restored in part; of a considerable degree of attraction will happen at the same time between the upper coating and the glass, which has frequently been strong enough to lift a piece of plate-glass weighing ten ounces (I). Neither coating will now show the least external sign of electricity while it is in contact with the glass; but on separating either of them from it, if care be taken to preserve their insulations, the upper coating will be strongly electrified negatively, and the under coating will be strongly electrified positively. Let then both coatings be brought to their natural state, by touching them when separated from the glass, with a conducting body not insulated, and let the glass be replaced between them as before. In this state of things, on touching the upper coating only, and separating it from the glass, it will not be capable of giving any spark; but on touching the coatings alternately five or six times, it will then give a weak spark; and this may now be repeated several times by only touching the upper coating: but on a second application of the bent wire to both coatings at the same time, a second discharge may be perceived, though much weaker than the first, and the coatings will be again brought into the same electrical state as immediately after the first discharge. This may frequently be repeated; and a considerable number of strong negative sparks may be taken from the coating when it is separated from the positive surface of the glass. If the glass in replacing it between the two plates be turned upside down, the electrical powers of both coatings will be changed by the next application of the discharging wire to complete the circuit; and a succession of strong positive sparks may be taken from the coating when it is separated from the negative surface of the glass.

9. It appears from this part of the experiment, that the coated part of the charged glass was not brought into its natural state by completing the circuit between the coatings; but that it still retained a degree of permanent electricity; that the powers of both coatings were actually changed at the time of the first discharge, and that a succession of the same powers may be produced in the coatings, without renewing the least application of electricity to the glass itself.

10. The whole quantity of electric matter added to the glass in charging it, is evidently distinguished into two parts in this experiment. The first part, which is by far the most considerable, appears to have been readily communicated from one surface of the glass to the other, along the bent wire, when it was first brought into contact with both coatings at the same time. The second part of the charge appears to be more permanent, and remains still united with the glass, notwithstanding the circuit has been completed (1). This permanent electricity, as well as the other, must be positive on the upper surface, and negative on the lower.

The passage of electric matter between the coating and the glass may help to exclude the air; and then the attraction of cohesion, and the prefluence of the external air both above and below, may be supposed to have the most considerable share in producing this effect.

(1) Some new terms seem to be wanted in order to express with precision the different parts of the charge. And if that part of it which cannot be destroyed by completing the circuit, should be called the permanent part of the charge, or more simply the charge; then might the other part, or that which may be destroyed by completing the circuit, be named the furcharge.
a coating to either surface; and then, whether this plate be charged by excitation or communication, one of its sides will be positive and the other side negative; and a succession of positive sparks may be produced on the negative side, and of negative sparks on the positive side, by a proper application of the insulated metal cover. It will be also found, that this redundant plate cannot be well charged, either by excitation or communication, unless a coating of some conducting matter should be kept in contact with the under surface; and it should also have some communication with the floor.

13. It has been very properly recommended to use a particular kind of rubber, and to attend to the state of it, in order to excite glass well; but it will not be necessary to pay the least regard to these circumstances in the following experiments, in which a method will be shown of charging a small phial and a plate of glass at the same time, by a gradual accumulation of power; that power being entirely derived from the glass itself, and with no other degree or kind of friction than is necessarily connected with the form of the experiment.

14. Place a circle of tin-foil five inches in diameter on the table, between a soft piece of baize and the middle of the fame plate of glass that was used in the last experiment, which will thus be coated on the under side; and in order to preserve a proper communication with this coating, let a fillet of tin-foil reach from it beyond the extremity of the glass. The same insulated metal cover is to be used for the upper coating as before. Let a thin ounce-phial of glass be filled with brass filings, and coated with tin-foil on the outside to about one inch from the top. Let a large brafs wire, the fifth part of an inch in diameter, pass through the cork of the phial into the filings, about an inch of it being left above the cork, and let the upper extremity of this wire be well rounded. This experiment requires, that the whole construction should be well warmed at first; and it will be necessary to repeat it at proper intervals, unless the atmosphere should be very dry.

15. Taking hold of the wire of the phial with one hand, let it be placed on the upper surface of the glass, and its bottom carried in contact over the middle of the upper surface, as far as the tin-foil coating reaches on the under side: and during this part of the operation, a finger of the other hand must be kept in contact with the fillet of tin-foil. Then lifting the phial by the wire with one hand, let it be placed on the insulated metal cover, suspended in the air with the other hand; and after lifting the hand from the wire to the coating, let the bottom of the phial be placed on the end of the tin-foil fillet. Place the insulated metal cover on the middle of the glass, and touch it with a finger of one hand, while the other hand touches the tin-foil fillet. Now lift the insulated cover by its stem, and bring the head of the cover in contact with the wire of the phial, and a very small spark of light will appear between them. Let this be repeated in the same manner about 15 times, taking care to preserve a proper communication between the coating and the floor. Then taking hold of the phial by the coating, let it be replaced on the insulated cover while it is suspended in the air; and after lifting the hand from the coating to the wire, let it be again placed on the middle of the glafs, and let the bottom be again carried in contact over the middle of the glass, holding the wire in one hand, while the other has a proper communication with the tin-foil coating. Let the phial be again returned to the tin-foil fillet as before, and let the insulated cover be applied repeatedly to the wire, immediately after every separation from the glass; and a brighter spark, together with a weak snapping, will now attend each application, if it be carefully observed to touch the cover with one hand before every separation, while the other hand rests on the fillet of tin-foil. By proceeding in this manner, after the third application of the phial to the glass, a very weak shock will be felt in those fingers which are used in completing the circuit of the glass; and after repeating two rounds more in the manner before mentioned, the phial will be fully charged. By applying the coating of the phial when it is in full force to the upper surface as before, the glass plate will get the greatest power it is thus capable of receiving, and will then give a shock as high as the elbows. After this, on attempting to lift the insulated cover, the glass itself will generally be lifted at the same time, with the tin-foil coating adhering to the under surface: but by continuing the separations of the cover from the glass, a succession of strong negative sparks may be produced by the influence of the upper surface; and by turning the glass over, and leaving the tin-foil coating on the baize, a succession of strong, positive sparks may be produced by the influence of the other side.

16. This experiment may be performed more readily by placing the glass, together with the tin-foil coating and baize, on a plate of metal about 1/4th of an inch thick, and of the same square as the glass. The whole may be fastened together by two small holdaffs placed at the opposite corners, which will prevent the glass from being lifted. This plate of metal will be useful in another view; for after it has been sufficiently warmed by retaining heat well, it will help to keep the glass dry, and consequently fit for use for a much longer time. But when it shall be required to show the contrary powers of the opposite sides of the glass, it will be more convenient not to fasten the parts together, and the whole may be kept sufficiently steady, by the operator's keeping down one corner of the glass with a finger, and by placing a proper weight on the opposite corner.

17. The bottom of the phial cannot be carried in contact over the glass without producing some little degree of friction; from which the power in this experiment is originally derived. The cover will appear on examination to be electrified negatively after every separation from the glass; but as it was touched in completing the circuit between the coatings before every separation, it necessarily follows, that the cover can have only an influential electricity, and consequently that the permanent power of the upper surface of the glass must be positive. The negative power of the cover is communicated to the wire of the phial, by which the inside is electrified negatively and the outside positively; and both these powers will increase with every application, because the circumstances of the phial are favourable to its charging. The phial must be insulated every time it is required to shift the hand from the wire to the coating, or from the coating to the wire; for
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for without this precaution the phial would be discharged. By applying the outside of the phial to the upper surface of the glafs, in the manner abovementioned, the phial will be partly discharged on that surface; and though it must be therefore weakened, the power of the glafs will be increased, and consequently enabled to produce a proportionally stronger effect on the brass cover, which by the next round of applications will give the phial a stronger charge than it had before. And thus a very small degree of original power is first generated, and then employed in performing two different accumulations: and by making each of these subservient to the increase of the other, the phial is at last fully charged, and the glafs plate acquires such a degree of the furcharge, as to give a pretty smart shock; and after that, it remains capable, by the influence of its permanent powers, of producing a succession of positive and negative sparks on the opposite surfaces.

18. The contrary charge may be given to the phial by taking hold of the coating, and carrying the wire in contact over the middle of the upper surface of the glafs, and by applying the power of the insulated cover to the coating; for if the operation be conducted in every other respect in the same manner as before, then will the inside be electrified positively, and the outside negatively. The powers of the glafs plate will be the same as they were in the former case.

19. After the phial has been fully charged negatively, by the processes of the last experiment, let it be insulated; and taking hold of the wire, let the bottom be held uppermost, and let the hand which holds it rest on the fillet of tin-foil. Apply the insulated cover to the glafs, and after touching it with a finger of the other hand, separate it from the glafs, and on bringing it towards the coating of the phial, a strong spark will pass between them. After repeating this a few times, the powers of the phial will be destroyed; and by continuing the same operation, they will be inverted; for the inside will be at last fully charged positively, and the outside negatively.

20. The same effect may be produced, by turning the glafs over, and by repeatedly applying the influential electricity, produced on that side, to the wire of the phial.

21. When the phial has been fully charged negatively, as in the last experiment, take hold of the coating of the phial with one hand, and while the other hand rests on the tin-foil fillet, apply the wire to the middle of the upper surface of the glafs, as far as the tin-foil coating extends on the other side. By this the powers of the glass plate will be changed.

22. Another, and perhaps a better method of applying the phial, is to place the insulated cover on the surface of the glafs, and then holding the phial by the coating in one hand, to apply the wire to the cover, while the other hand touches the fillet of tin-foil; by which a shock will be given, and the same change of powers will be produced in an instant, which before took up some little time. On lifting the insulated cover by its item immediately after the shock, it will be negative, or have the same power as at the instant of the phial; and by once replacing the cover, and completing the circuit of the glafs plate the furcharge will be destroyed; another shock will be felt; and the power of the cover, after the next separation, will be positive, or contrary to that of the inside of the phial. Apply this positive power to the wire insulated of the phial as before; and after 15 applications, the powers of the phial will be destroyed: and by still proceeding in the same manner, the powers of the phial will be changed, and the inside will be fully charged positively and the outside negatively, by 60 applications.

23. These effects may also be produced by a single application of the coating of the phial to the other side of the glafs plate; and by repeated applications of the influential electricity, produced on the same side, to the coating of the phial.

24. If it were simply the object in this experiment to change the powers of the phial, the operation might then be considerably shortened, by completing the circuit of the phial, and consequently destroying the whole furcharge: but it was intended to shew what effects might be produced, by opposing the contrary powers to each other; and by doing this it appears that either side of the glafs plate can destroy the powers of the phial, and give it a contrary charge; that either side of the phial can also change the powers of the glafs plate; and that the powers of the glafs plate, thus inverted, can again destroy the powers of the phial, and give it a full charge of the contrary electricity.

25. Here it may be observed, that in some cases, the quality of the power may be determined by observation alone. When the phial employed in the two last experiments has been fully charged, it may be known whether the inside be positive or negative, from the light which appears at the wire, or from the hissing noise which attends it: for when the phial has been fully charged positively, if the room be sufficiently darkened, a bright luminous appearance may be seen, diverging in separate rays to the distance of an inch, attended with an interrupted hissing noise; and both the light and the noise continue a very short time. But when the phial is fully charged negatively, a weaker and more uniform light appears, which does not extend itself more than the sixth part of an inch, and is attended with a clofer and more uniform hissing; and this noise and light always continue longer than the former. Even positive and negative sparks, passing between the insulated cover and a finger, may be distinguished from each other: for the positive sparks are more divided, give less light, make a weaker snapping noise, and affect the finger less sensibly than the negative.

26. The strongest sparks which can be produced in these experiments, are those that pass between the coating of the phial and the insulated cover, when they produce contrary powers; but they will be more particularly vigorous, if the coating be positive and the insulated cover negative.

In Sect. vi. of this treatise we have related some experiments, tending to shew, that in the act of charging a phial with positive electricity, both became positive; and in the act of charging one negatively, both became negative. These were inferred from the former edition of this work; since which time Mr Brookes, at Norwich, has published a tract; in which he not only adopts the opinion, but lays claim to it as his discovery, from some letters wrote in the year 1775. His experiments are extremely well adapted to elucidate the point intended; and the most remarkable of them are as follow:
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In this experiment, let both the former bottles be discharged, and the latter remain charged; then let one of them be placed upon the outside coating of the former, and the other upon the inside coating of the second phial. Let the phial be held in the hand, and while the other, which at the same time is being charged, is placed upon the inside coating of the second, it will always repel the former, as if it were not insulated; then will the former phial be attracted, the common air being between them, and the atmosphere, which at the same time is being charged, taking place in the exterior coating of the former, and the interior coating of the latter; then, with an insulated discharging rod, make a communication from the ball in one bottle to the other, and the phial which is negatively charged, will take place in the exterior coating of the first, and the interior coating of the latter, which at the same time is being charged, will repel the former. This is a proof of a phial to be positive and the other negative at the time they are charging, is a mistake; as well as that, if any number of bottles be suspended at the tail of each other, all the intermediate surfaces or sides do not continue so.

4. Here also let the apparatus be disposed of in the same manner, till the bottles are highly charged: then, with a clean piece of glass, or the like, remove the communication between the ball of the first phial and the prime conductor before the machine ceases working; then, with an insulated discharging rod, make a communication from the inside of the first phial; a strong explosion will take place on account of the excess within sides, notwithstanding they are both positive.

5. This experiment being something of a continuation of the preceding one, immediately after the last explosion takes place, discharge the prime conductor of its electricity in the atmosphere; then let the ball in the first phial with the hand, or any conducting substance that is not insulated; then will the inside coating of the first phial, which at first was strongly positive, be in the same state as the outside coating of the second, having a communication by the hand, the floor, &c. with each other; that is, negative, if any thing can properly be called negative or positive that has a communication with the common stock: but a pair of cork balls that are electrified either plus or minus, will no more be attracted by either the inside coating of the first phial or the outside coating of the second, than the phial will be by the hand on which they stand, or a common chair in the room, while they continue in that situation. Remove the aforesaid communication from the ball of the first phial:
phial; touch the ball in the second, as before in the first, or discharge the bottle with the discharging rod, and the ball in the first bottle will immediately become positive; with a pair of cork balls, electrified negatively, approach the ball in the first phial, and they will all repell each other, or, if the cork balls be electrified positively, they will be attracted. All these circumstances together seem fully to prove what has already been said, not only that the inside of the first phial, which was so strongly positive, may be altered so as to become in the same state as the outside of the second, without discharging the phial, or any more working the machine; but that it may be fairly changed, from being positively charged to being negatively charged. If a pair of cork balls are now hanged on to the ball of the wire in this phial, by the help of a stick of glass, they will repell each other, being negatively electrified. Make a communication from the outside of the bottle to the table, and replace the communication from the prime conductor to the ball in the bottle; then, upon moderately working the machine to charge the bottle, the cork balls will cease to repell each other till they touch, and will soon repell each other again by being electrified positively. Here the working the machine anew, plainly shows that the inside of the first bottle, which was positive, was likewise changed to negative.

"In making electrical experiments, and in particular those in which the Leyden phial is concerned (a number of which together compose most electrical batteries), a method to preserve the bottles or jars from being struck through by the electrical charge is very desirable; but I do not know that it has hitherto been accomplished. The number of them that have been destroyed in the foregoing, as well as in many experiments made long before, have led me to various conjectures to preserve them; at the same time I have been obliged to make use of bottles instead of open mouthed jars. And as coating the former within-side is very troublesome, it has put me on thinking of some method more easy, quicker, and equally firm and good, as with the tin-foil. With respect to the new method of coating, I failed; though something else presented itself rather in behalf of the former: therefore introducing the procés here will not be of very great use; unless in faving another the trouble of making use of the same method, or giving a hint towards the former, so as to succeed with certainty. My aim was, to find something that should be quick and clean, and not easy to come off with the rubbing of wires against it, and yet a good conductor. My first idea was with a cement of pitch, rosin, and wax, melted together; into which, to make it a good conductor, I put a large proportion of finely sifted brass filings. When this mixture was cold, I put broken pieces of it into the bottle, and warmed the bottle till it was hot enough to melt the cement in it so as to run, and cover the bottle within-side; then I coated the out side with tin-foil as is commonly done, and now it was fit for use, or ready to be charged: to which I next proceeded; and I believe I had not made more than four or five turns of the wench before it spontaneously struck through the glass with a very small charge. I then took off the outside coating, and stopped the fracture with some of my common cement, after which I put the coating on again; and, in as little time as before, it was struck through again in a different place; and thus I did with this bottle five or six times; sometimes it struck through the cement, but it struck through the glass in four different places. This made me consider what it might be that facilitated the spontaneous striking through the glass, and likewise what might retard it. I had long before thought that jars or bottles appeared to be struck through with a much less charge, just after their being coated, or before they were dry, than when they had been coated long enough for the moisture to be evaporated from the paste with which I mostly lay on the tin-foil; and could only consider the dry paste as a kind of mediator between the tin-foil and the glass, or, in other words, that the moisture in the paste was a better conductor, and more in actual contact with the glass, that the paste itself when dry. And the coating the bottles with the heated cement, though long afterward, did not alter my former idea; for it appeared as if the hot cement, with the conducting subfance in it, might be still more in actual contact with the glass than the moisture in the paste. On these probabilities I had to consider what might act as a kind of mediator more effectually than the dry paste between the glass and the tin-foil. It occurred, that common writing-paper, as being neither a good conductor nor insulator, might be serviceable by being first pasted smoothly to the tin-foil and left to dry. The paper then being pasted on one side, having the tin-foil on the other, I put them on the glass together with the tin-foil outward, and rubbed them down smoothly. This succeeded so well that I have never since had any struck through that were thus done, either common phials, or large bottles which contain near three gallons each, though some of the latter have stood in the battery in common use with the other a long time. And as I have never had one struck through that has been prepared in this way, I am much less able at present to tell how great a charge they will bear before they are struck through, or whether they will be struck through at all.

In the last part of the Philosophical Transactions for 1789, we have the following experiments by Mr Nicholason, on a new method of excitation, as well as a new method of excitation, and the direction of the fluid in positive and negative electricity.

1. A glass cylinder was mounted, and a cushion applied with a silk flap, proceeding from the edge of the cushion over its surface, and thence half round the cylinder. The cylinder was then excited by applying an amalgamated lead, in the usual manner. The electricity was received by a conductor, and passed off in sparks to Lane's electrometer. By the frequency of these sparks, or by the number of turns required to cause spontaneous explosion of a jar, the strength of the excitation was ascertained.

2. The cushion was withdrawn about one inch from the cylinder, and the excitation performed by the silk only. A stream of fire was seen between the cushion and the silk; and much fewer sparks passed between the balls of the electrometer.
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"3. A roll of dry silk was interposed, to prevent the
stream from passing between the cylinder and the silk.
Very few sparks then appeared at the electrometer.
"4. A metallic rod, not insulated, was then inter-
posed instead of the roll of silk, so as not to touch any
part of the apparatus. A dense stream of electricity
appeared between the rod and the silk, and the con-
ductor gave very many sparks.
"5. The knob of a jar being substituted in the place
of the metallic rod, it became charged negatively.
"6. The silk alone, with a piece of tin-foil applied
behind it, afforded much electricity, though less than
when the cylinder was applied with a light pre-"flure.
The hand being applied to the silk as a cylinder, pro-
duced a degree of excitation seldom equalled by any
other cylinder.
"7. The edge of the hand answered as well as the
palm.
"8. When the excitation by a cylinder was weak, a
line of light appeared at the anterior part of the cylinder,
and the silk was strongly depoied to receive electricity
from any uninsulated conductor. These appearances
did not obtain when the excitation was by any means
made very strong.
"9. A thick silk, or two or more folds of silk, ex-
cited more than a single very thin filk. I use the filk
which the milliners call Persian.
"10. When the silk was separated from the cylinder,
sparks passed between them; the silk was found to be
in a weak negative, and the cylinder in a positive state.
"The foregoing experiments show that the office of
the silk is not merely to prevent the return of electric-
ity from the cylinder to the cylinder, but that it is the
chief agent in the excitation; while the cylinder serves
only to supply the electricity, and perhaps increase the
prefluence at the entering part. There likewise seems
to be little reason to doubt but that the disposition of
the electricity to escape from the surface of the cy-
dinder is not prevented by the interposition of the filk, but
by a compensation after the manner of a charge; the
filk being then as strongly negative as the cylinder is
positive: and, lastly, that the line of light between the
filk and cylinder in weak excitations does not consist of
returning electricity, but of electricity which passes to
the cylinder, in consequence of its not having been suffi-
cently supplied during its contact with the rubbing surface.
"11. When the excitation was very strong in a cy-
dinder newly mounted, flashes of light were seen to fly
across its inside, from the receiving surface to the sur-
face in contact with the cylinder, as indicated by the
brush figure. These made the cylinder ring as if struck
with a bundle of small twigs. They seem to have ar-
isen from part of the electricity of the cylinder taking
the form of a charge. This appearance was observed in
a 9-inch and a 12-inch cylinder, and the property went
off in a few weeks. Whence it appears to have been
ciently occasioned by the rarity of the internal air
produced by handling, and probably reforted by gra-
dual leaking of the cement.
"12. With a view to determine what happens in the
inside of the cylinder, recourse was had to a plate ma-
chine. One cylinder was applied with its filken flap.
The plate was 9 inches in diameter and 2/ths of an
inch thick. During the excitation, the surface oppo-
site to the cylinder strongly attracted electricity, which
gave out when it arrived opposite to the extremity
of the flap: so that a continual stream of electricity
passed through an insulated metallic bow terminating
in balls, which were opposed, the one to the surface op-
posite the extremity of the filk, and the other opposite
to the cylinder; the former ball showing positive and
the latter negative signs. The knobs of two jars being
substituted in the place of these balls, the jar applied
to the surface opposite to the cylinder was charged neg-
atively, and the other positively. This disposition of
the back surface, seemed, by a few trials, to be weaker
the stronger the action of the cylinder, as judged by
the electricity on the cylinder side.
"Hence it follows, that the internal surface of a cy-
dinder is so far from being disposed to give up electricity
during the friction by which the external surface acquires
it, that it even speedily attracts it.
"13. A plate of glass was applied to the revolving
plate, and thrust under the cylinder in such a manner
as to supply the place of the silk flap. It rendered the
electricity stronger, and appears to be an improvement
of the late machine; to be admitted if there were not
essential objections against the machine itself.
"14. Two cylinders were then applied on the oppo-
site surfaces with their flaps, so as to clasp the plate
between them. The electricity was received from
both by applying the finger and thumb to the opposite
surfaces of the plate. When the finger was advanced
a little towards its correspondent cylinder, so that its dis-
""ance was less than between the thumb and its cy-
dinder, the finger received strong electricity, and the thumb
none; and, contrariwise, if the thumb were advanced
beyond the finger, it received all the electricity, and
none paid to the finger. This electricity was not
stronger than was produced by the good action of one
cylinder applied strongly.
"15. The cylinder in experiment 12, gave mo electric-
ity when the back surface was supplied, provided that
surface was sufficed to retain its electricity till the
rubbed surface had given out its electricity.
"From the two last paragraphs it appears, that no
advantage is gained by rubbing both surfaces; but that
as much electricity as the present methods of excitation
seem capable of collecting; but that, when the exci-
tion is weak, on account of the electric matter not
passing with sufficient facility to the rubbed surface,
the friction enables the opposite surface to attract or
receive it, and if it be supplied, both surfaces will pass
off in the positive state; and either surface will give
out more electricity than is really induced upon it, be-
cause the electricity on the opposite side forms a charge.
It may be necessary to observe, that I am speaking of
the faults or effects produced by friction; but how the
rubbing surfaces act upon each other to produce them,
whether by attraction or otherwise, we do not here en-
quire.
"It will hereafter be seen, that plate machines do
not collect more electricity than cylinders (in the hand of
the electrical operators of this metropolis) do with half
the rubbed surface; which is a corroborator of the inference here made.
"16. When a cylinder is weakly excited, the ap-
pearances mentioned (par. 8.) are more evident the more
rapid
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Rapid turning. In this case, the avidity of the surface of the cylinder beneath the glass is partly supplied from the edge of the silk, which throws back a broad cascade of fire, sometimes to the distance of above 12 inches. From these causes it is that there is a determinate velocity of turning required to produce the maximum of intensity in the conductor. The stronger the excitation, the quicker may be the velocity; but it rarely exceeds five feet of the glass to pass the cushion in a second.

17. If a piece of silk be applied to a cylinder, by drawing down the ends so that it may touch half the circumference, and the cylinder be then turned and excited by applying the amalgated leather, it will become very greedy of electricity during the time it passes under the silk. And if the entering surface of the glass be supplied with electricity, it will give it out at the other extremity of contact; that is to say, if insulated conductors be applied at the touching ends of the glass, the one will give, and the other receive, electricity, until the intensities of their opposite states are as high as the power of the apparatus will bring them; and these states will be instantly reversed by turning the cylinder in the opposite direction.

As this discovery promises to be of the greatest use in electrical experiments, because it affords the means of producing either the plus or minus states in one and the same conductor, and of instantly repeating experiments with either power, and without any change of position or adjustment of the apparatus, it evidently deferred the most minute examination.

18. There was little hope (par. 6.) that cusions could be dispensed with. They were therefore added; and it was then seen, that the electrified conductors were supplied by the difference between the action of the cushion which had the advantage of the silk, and that which had not; so that the naked face of the cylinder was always in a strong electric state. Methods were used for taking off the pressure of the receiving cushion; but the extremity of the silk, by the construction, not being immediately under that cushion, gave out large flashes of electricity with the power that was used. Neither did it appear practicable to present a row of points or other apparatus to intercept the electricity which flew round the cylinder; because such an addition would have materially diminished the intensity of the conductor, which in the usual way was such as to flash into the air from rounded extremities of four inches diameter, and made an inch and half ball become luminous and blow like a point. But the greatest inconvenience was, that the two states with the backward and forward turn were seldom equal; because the disposition of the amalgam on the silk, produced by applying the leather to the cylinder in one direction of turning, was the reverse of what must take place when the contrary operation was performed.

Notwithstanding all this, as the intensity with the two cusions was such as most operators would have called strong, the method may be of use, and I shall mean to make more experiments when I get possession of a very large machine which is now in hand.

19. The more immediate advantage of this discovery is, that it suggested the idea of two fixed cushions with a moveable silk flap and rubber. Upon this principle, which is so simple and obvious that it is wonderful it should have been so long overlooked, I have constructed a machine with one conductor, in which the two opposite and equal states are produced by the simple process of loosening the leather-rubber, and letting it pass round with the cylinder (to which it adheres) until it arrives at the opposite side, where it is again fastened. A wish to avoid proximity prevents my describing the mechanism by which it is let go and fastened in an instant, at the same time that the cushion is made either to press or is withdrawn, as occasion requires.

20. Although the foregoing series of experiments naturally lead us to consider the silk as the chief agent in excitation; yet as this business was originally performed by a cushion only, it becomes an object of enquiry to determine what happens in this case.

21. The great Beccaria inferred, that in a simple manner excitation is performed by a simple rubber without a silk flap.

How to produce both electricities in the same conductor.

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Velocity necessary to produce the utmost degree of excitation.

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Improved method of excitation.
of a 3-inch ball in a succession too quick to be counted, and a ball of 1 inch diameter was rendered luminous, and produced a strong wind like a point. A cylindrical 9-inch cylinder with an 8-inch cushion occasioned frequent flashes from the round end of a conductor 4 inches in diameter; with a ball of 2 inches diameter the flashes ceased now and then, and it began to appear luminous: a ball of 1½ inch diameter first gave the usual flashes; then, by quicker turning, it became luminous with a bright speck moving about on its surface, while a constant stream of air rushed from it; and, lastly, when the intensity was greatest, brushes of a different kind from the former appeared. These were less luminous but better defined in the branches, many started out at once with a hoarse sound. They were reddish at the stem, sooner divided, and were greenish at the point next the ball, which was brazen. A ball of 4½ inches in diameter was surrounded by a steady faint light, enveloping its exterior hemisphere, and sometimes a flash struck out at top. When the excitation was strongest, a few flashes struck out sideways. The horizontal diameter of the light was longest, and might measure one inch, the item of the ball being vertical.

This last phenomenon is similar to a natural event related by M. Loammi Baldwin * who raised an electri
cal kite in July 1774 during the approach of a severe thunder-storm, and observed himself to be furrounded by a rare medium of fire, which as the cloud rose nearer the zenith, and the kite rose higher, continued to extend itself with some gentle faint flashes. Mr Baldwin felt no other effect than a general weakness in his joints and limbs, and a kind of listless feeling; all which he observes might possibly be the effect of paroxysm, though it was sufficient to discourage him from persevering in any farther attempt at that time. He therefore drew in his kite, and retired to a shop till the storm was over, and then went to his house, where he found his parents and friends much more surprised than he had been himself; who, after expressing their astonishment, informed him, that he appeared to them (during the time he was raising the kite) to be in the midst of a large bright flame of fire, attended with flashings: and that they expected every moment to see him fall a sacrifice to the flame. The flame was observed by some of his neighbours, who lived near the place where he floated.

This fact is similar to another observed by M. de Saffurié on the Alps, and both are referable to my luminous ball with the second kind of brush. The cloud must have been negative.

With a 12-inch cylinder and rubber of 7½ inches, a five-inch ball gave frequent flashes, upwards of 14 inches long, and sometimes a 6-inch ball would flash. I do not mention the long spark, because I was not provided with a favourable apparatus for the two larger cylinders. The 7-inch cylinder affords a spark of 10½ inches at best. The 9-inch cylinder, not having its conductor insulated on a support sufficiently high, afforded flashes to the table which was 14 inches distant. And the 12-inch cylinder, being mounted only by a model or trial for constructing a larger apparatus, is defective in several respects which I have not thought fit to alter. When the five-inch ball gives flashes, the cylinder is enveloped on all sides with fire which ruffles from the receiving part of the conductor.

3. The cylinder, being mounted only by a model or trial for constructing a larger apparatus, is defective in several respects which I have not thought fit to alter. When the five-inch ball gives flashes, the cylinder is enveloped on all sides with fire which ruffles from the receiving part of the conductor.
I never use points, but in a simple machine bring the conductor almost in contact with the cylinder. In this apparatus that cushion to which the rubber is not applied serves that purpose.

"24. These marks exhibit the intensity as deduced from simple electrifying. I will now mention the rate of charging, which was nearly the same in all the three cylinders."

A large jar of 350 square inches, or near 25 square feet, with an uncoated varnished rim of more than four inches in height, was made to explode spontaneously over the rim. The jar, when broken, proved to be 0.082 inches thick on an average; and the number of square feet of the surface of the cylinder which was rubbed to produce the charge of one foot, was, when least, 19.03, and when most, with good excitation, 19.34.

The great machine at Haarlem charges a single jar of one foot square by the friction of 66.6 square feet, and charges its battery of 225 square feet at the rate of 94.8 square feet rubbed for each foot. The intensity of electricity on the surface of the glass is therefore considerably less than 1/4 of that here spoken of; but if we take the most favourable number 66.6 at the commencement of tinsiping, and halve it on account of the unavoidable imperfection of a plate machine (as shown in par. 14.), it will be found, that the mass of electricity applied to that mass of glass would cause a cylinder to charge one square foot by the friction of 224 square feet. It must be observed, however, that M. Van Marum's own machine, consisting of two plates 33 inches diameter, has only half the intensity, though he reckons it a very good one. This machine is about equal in absolute power to my 9-inch cylinder, with its short rubber; but it is near 30 times as dear in price. In all these deductions I omit the computations, for the sake of brevity, and because they are easily made. The data are found in the description of the Teylerian machine, and its continuation published at Haarlem in the years 1785 and 1787.

"I shall here take the liberty of observing, that the action of the cylinder, by a simple cushion or the hand, which excited the auffonition of all Europe, in the memory of our cotemporaries, was attended with the appearance of the least sharp sparks with a hoarse or chirping noise. When the ball was less than two inches in diameter, it was usually covered with short flames of this kind, which were very numerous.

"26. When two equal balls were presented to each other, and one of them was rendered strongly positive, while the other remained in connection with the earth, the positive brush or ramified ball was seen to pass from the electrified ball: when the other ball was electrified negatively, and the ball, which before had been positive, was connected with the ground, the electricity (paling the same way according to Franklin) exhibited the negative flame, or dense, straight, and more luminous spark, from the negative ball; and when the one ball was electrified plus and the other minus, the signs of both eletricities appeared. If the interval was not too great, the long zig-zag spark of the plus ball struck the straight flame of the minus ball, usually at the distance of about one inch from the point, rendering the other 4/5 very bright. Sometimes, however, the positive spark struck the ball at a distance from the negative flame. These effects are represented in Plate CLXXVIII. fig. 86, 87, 88.

"27. Two conductors of three-quarters of an inch diameter, with spherical ends of the same diameter, were laid parallel to each other, at the distance of about two inches, in such a manner as that the ends pointed in opposite directions and were six or eight inches afloat. These, which may be distinguished by the letters P and M, were successively electrified as the balls were in the last paragraph. When one conductor P was positive, fig. 90, it exhibited the spark of that electricity in its extremity, and struck the definite (small) conductor M. When the last mentioned conductor M was electrified negatively, fig. 89, the former being in its turn connected with the earth, the sparks ceased to strike as before, and the extremity of the electrified conductor M exhibited negative signs, and struck the side of the other conductor. And when one conductor was electrified plus and the other minus, fig. 91, both signs appeared at the same time, and continued streams of electricity passed between the extremities of each conductor to the side of the other conductor opposed to it. In each of these three cases, the current of electricity, on the hypothesis of a single fluid, passed the same way.

"28. In drawing the long spark from a ball of four inches diameter, I found it of some consequence that the electrical balls should not be too short, because the vicinity of the large prime conductor altered the disposition of the electricity as the electricity to escape: I therefore made a set of experiments, the result of which showed, that the disposition of balls to receive or emit electricity is great when they stand remote from other surfaces in the same state; and that between this greatest disposition in any ball, whatever may be its diameter, every possible least degree may be obtained by withdrawing the ball towards the broader or less convex surface out of which its stem projects, until at length the ball, being wholly depressed beneath that surface, loses the disposition entirely. From these experiments it follows, that a variety of balls is unnecessary in electricity; because any small ball, if near the prime conductor, will be equivalent to a larger ball whose stem is longer.

"29. From comparing some experiments made by the author many years ago with the present facts, I conceived it would be instructive to form a point, and introduce an instrument consisting of a brass ball of six inches diameter, through the axis of which a stem, carrying a fine point, was screwed. When this stem..."
ELECTRICITY.

Miscellaneous Experiments.

If the ball be moved on its axis in either direction, it causes the fine point either to protrude from the negative side of the jar, or to withdraw itself; because by this means the ball runs along the stem. The disposition of the point to transmit electricity may thus be made equal to that of any ball whatever, from the minutest size to the diameter of six inches. See fig. 92. A.

30. The action of pointed bodies has been a subject of diffusion ever since it was first discovered, and is not yet well explained. To those who ascribe this effect to the figure of electric atmospheres, and their disposition to fly off, it may be anwered, that they ought first to prove their existence, and then show why the caufe which accumulated them does not prevent their escape; not to mention the difficulty of explaining the nature of negative atmospheres. If these be supposed to consist of electrified air, it will not be easy to shew why a current of air passing near a prime conductor does not destroy its effects. The opinion supported by the celebrated Volta and others, that a point is the coating to an infinitely small plate of air, does not appear better founded; for such a plate must be broken through at a greater distance only because charged; whence it would follow, that points should not act but at high intensities. I must likewise take notice, as a proof that the charge has little to do here, that if a ball be presented to the prime conductor, at the same time that a point proceeds from the opposite side of the ball, the electricity will pass by the point, though it is obliged to go round the ball for that purpose; but it can hardly be doubted, that whatever charge obtains in this case is on the surface of the ball next the conductor, and on the remote side to which the electricity directs its course.

31. The pointed apparatus described (par. 29.) shows that the effect of points depends on the remoteness of their extremities from the other parts of the conductor. This leads to the following general law: In any electrified conductor, the transition or escape of electricity will be made chiefly from that part of the surface which is the most remote from the natural state. Thus in the apparatus of the ball and stem, the point having a communication with the rest of the whole conductor,constantly poiffes the fame intensity; but the influence of the surrounding surface of the ball diminishes its capacity. This diminution is less the farther the ball is withdrawn, and consequently the point will really possess more electricity, and be more disposed to give it out when it is prominent than when depressed. The fame explanation serves for negative electricity.

32. The effect of a positive surface appears to extend farther than that of a negative: for the point acts like a ball when considerably more prominent if it be positive than it will if negative.

"For the sake of conciseness, I pass over many facts which have presented themselves in the course of my experiments on the two elecctricities, and content myself with observing, that there is scarcely any experiment made with the positive power, which will not afford a refult worthy of notice, if repeated with the negative."

With regard to the direction of the electric fluid, we shall only farther take notice of two experiments, which have been thought to prove directly the passage of the fluid outward from the positive and inward to the negative side of the phial. Fig. 18. represents an electric jar, whose exterior coating is made of place small pieces of tin-foil placed at a fim distance from each other. This jar is to be charged in the usual manner, when small sparks of the electirc fluid will pass from one piece of tin-foil to the other, in various directions, forming a very pleasing spectacle. The separation of the tin-foil is the cause of this visible passage of the fluid from the outside to the table; and the experiment is similar in appearance to that of the spiral tube mentioned in the foregoing section. If the jar be discharged by bringing a pointed wire gradually to the knob $T$, the unsealed part of the glass between the wire and knob will be agreeably illuminated with a crackling noise of the sparks. If the jar be suddenly discharged, the whole outside will be illuminated. The jar, in this experiment, must be very dry when used.

Fig. 19 represents two jars, or Leyden phials, placed one over the other, by which various experiments may be made in order to elucidate the common theory. Bring the outside coating of the bottle $A$ in contact with the positive conductor, and turn the machine till the bottle is charged; then place one ball of the discharging rod upon the coating of $B$, and with the other touch the knob of the jar $A$, which will cause an explosion; now place one ball of the discharger on the knob $A$, and bring the other ball to its contacts, and you have a second discharge. Again, apply one ball of the discharger to the coating of $B$, and carry the other to the coating of $A$, and it will produce a third discharge. A fourth is obtained by applying the discharger from the coating of $A$ to its knob. The outer coating of the under jar communicating with the inside of the under one, conveys the fluid from the conductor to the large jar, which is therefore charged positively: the upper jar does not charge, because the inside cannot part with any of its electric fluid; but when a communication is formed from the outside of $A$ to the inside of $B$, part of the fire on the inside of $A$ will be conveyed to the negative coating of $B$, and the jar will be discharged. The second explosion is occasioned by the discharger of the jar $A$; but as the outside of this communicates, by conducting substances, with the positive inside of the jar $B$, the ball of the discharging rod remains for a little time after the discharge on the knob of $A$, part of the fire of the inside of $A$ will escape, and be replaced by an equal quantity on the outside from the jar $B$, by which means $A$ is charged a second time; the discharge of this produces the third, and of $B$ the fourth explosion.

Fig. 20. is an electric jar, which serves to illustrate the contrary states of the side of a Leyden phial while charging. $B$ is the tin-foil coating; $C$ a stand which supports the jar; $D$ a socket for metal, carrying the glass rod $E$, a bent brass wire pointed at each end, and fixed at the end of the rod $G$; which rod is movable in the spring tube $N$ at pleasure: that tube being fixed by a socket on the top of the glass rod $E$, the jar is charged by the inside wire, which communicates with the different divisions of the inside coating by horizontal wires.
ELECTRICITY.

Vitriolic acid air, obtained from vitriolic acid and Miscella-
neous Experiments.  

nitric acid, obtained from vitriolic acid and Miscella-
neous Experiments.

Place the jar to the conductor as usual; and, when charg-
ing, a luminous spark will appear upon the upper-
point of the wire at F, clearly showing, according to
the commonly received opinion, that the point is
then receiving the electrical fluid. From the upper
ring of coating B, on the outside of the jar, a fine
stream or pencil of rays will at the same time fly off,
beautifully diverging from the lower point of the wire
F upon the bottom ring of the coating of the jar. When
the appearances cease, which they do when the jar is
charged, let a pointed wire be presented towards the
conductor: this will soon discharge the jar silently;
during which the point will be illuminated with a
small spark, while the upper point of the wire will
throw off a pencil of rays diverging towards the upper
ring of the coating.

We shall conclude this section with an account of
some effects of the electrical fluid upon various elastic
vapours. These were tried to the greatest advantage
by Dr Van Marum with the great success of the ex-
periments already described. He used a cylindrical
glass receiver five inches long and an inch and a
quarter in diameter, into which different sorts of elas-
tic fluids were successively injected, and were confined
by quicksilver or water. To a hole made in the bot-
tom of the inverted glass receiver an iron wire was
furnished, the external part of which communicated
with a conductor, which being presented to the prime
conductor of the machine, received the sparks from it.
In this disposition of the apparatus it evidently ap-
pears, that the sparks passed through the elastic fluid
contained in the receiver, by going from the inner ex-
travirtu of the wire to the quicksilver or water in which
the receiver was inverted. With this apparatus it was
found, that dephlogifogicated air, obtained from mer-
curial red precipitate, lost \( \frac{7}{8} \) th of its bulk; but its qua-
lity was not sensibly altered, as it appeared from exa-
mining it with the eudiometer. This experiment be-
ing repeated when the receiver was inverted in lime-
water, and likewise in the infusion of turnsole, there
existed no precipitation, no change of colour, nor any
phlogification of the air. On pouring out this air, the
smell of the elastic fluid was perceived very
sensibly.

Nitrogen air was diminished of more than the half of
its original bulk; and in that diminished state, being
mixed with common air, it occasioned no red colour,
nor any sensible diminution. It had lost its usual
smell, and it extinguished a candle. In passing the
sparks through the nitrous air, a powder is formed
on the surface of the quicksilver, which is a part of
that metallic subsance dissolved by the nitrous acid.

Inflammable air, obtained from iron and diluted vi-
triolic acid, communicated a little redness to the tine-
ture of turnsole. The stream of electric fluid thro
this air appeared more red, and much larger, than in
common air, being every where surrounded by a faint
blue light.

The inflammable air, obtained from spirit of wine
and vitriolic acid, was increased to about three times
its original bulk, and lost a little of its inflammability.

Fixed air, from chalk and vitriolic acid, was a little
increased in bulk by the action of electricity; but it
was rendered less absorbable by water.
Electrivity.

MISCELLANEOUS EXPERIMENTS.

The experiment was repeated with pure air, produced by minium, moistened with the vitriolic acid, and deprived of its fixed air; seven parts of this were mixed with three of phlogistic air; and the lime, added to the height of 4 1/2 inches. Here, as in the former experiment, the diminution continued without any decrease; and the lime, after it had absorbed 22 1/2 inches, and consequently 178 times its own measure of air, was very far from being saturated with the nitrous acid.

On this Dr. Van Marum wrote to Mr. Cavendish: and finding, by his answer that this gentleman had used pure air, obtained from a black powder produced by shaking mercury with lead, he requested to be informed of the process by which it is generated: but Mr. Cavendish, not choosing to communicate this at present, he determined to defer the repetition of the experiment till this ingenious philosopher shall have published his mode of obtaining the pure air used in it.

Our author then goes on to some experiments made by suffusing the electric fluid to pass in a continued stream through various kinds of air, enclosed for this purpose in the little glass tubes used in the last experiments.

Pure air obtained the week before from red vitriol, and electrified for 20 minutes, was diminished by 4th, the surface of the quicksilver soon began to be calcined, and towards the end of the experiment the glass tube was so lined with the calx as to cease to be transparent. By introducing a piece of iron, the electric stream was made to pass through the air without immediately touching the mercury; yet this was equally calcined. The phenomenon the Doctor ascribes solely to the dilution of the pure air, the principle of which unites itself with the metal; as in these experiments the mercury had not acquired any fentible heat. Two inches and three-quarters of the air being placed over water, and electrified in the same manner during half an hour, lost a quarter of an inch; and being suffered to stand 12 hours in the tube, was found to have lost 1/4 of an inch more. This was very near the same diminution of the air that had taken place when it was electrified over mercury; but, in this case, the procés appears to be more slow, and the detached principle not so easily absorbed. The air remaining after these experiments, being tried by the endiometer, did not differ from unelectrified pure air taken from the same receiver.

To determine whether the pure air retained any of the acid employed in its production, the Doctor repeated the experiment with air obtained from red precipitate, confined by an infusion of turpentine, but could not perceive in it the least change of colour. He also electrified air obtained from minium and the vitriolic acid, placed over some diluted vinegar of lead; but this was not rendered at all turbid.

Three inches of phlogistic air being electrified, during the first 5 minutes were augmented to 24th inches, and in the next 10 minutes to 2 1/4th inches; some lime was then introduced to try whether this would absorb it, but upon being electrified 15 minutes, the column rose to the height of 32th inches. It was suffered to stand in the tube till the next day, when it was found to have sunk to its original dimensions.

Nitrous acid, confined by lime, being electrified during half an hour, lost 3 quarters of its bulk; the lime appeared to have absorbed a great deal of nitrous acid; and the air remaining in the tube did not seem to differ from common phlogistic acid. Some of the same nitrous acid, confined by lime, was, by standing 3 weeks, diminished to half its bulk, and this residuum also proved to be phlogistic acid. Thus electricity very speedily effects that separation of the nitrous acid from nitrous air, which is slowly produced by the lime alone.

Inflammable air obtained from steel-filings and the diluted vitriolic acid, being confined by an infusion of turpentine, was electrified for 10 minutes without any change of colour in the infusion, or any alteration in the bulk of the air. The tube being filled with the same air to the height of 2 1/2 inches, and placed in diluted vinegar of lead, was exposed to the electric stream during 12 minutes, in which time the enclosed air rose 5 inches: but the vinegar remained perfectly clear. Three inches of inflammable air obtained from a mixture of spirits of wine with oil of vitriol, on being electrified for 15 minutes, rose to 10 inches; thus diluted, it lost all its inflammability, and when nitrous air was added, no diminution ensued.

A column of alkaline air obtained by heat from spirit of sal ammoniac, 15 inches high, was electrified 4 minutes, and rose to 6 inches, but did not rise higher when electrified 10 minutes longer. It appears that this air is not expanded more by the powerful electric stream from this machine than by the common spark. Water would not absorb this electrified air, which was in part inflammable.

The tube, being filled to the height of an inch with spirit of sal ammoniac, and inverted in mercury, was electrified 4 minutes, and rose to 6 inches, but did not rise higher when electrified 10 minutes longer. It appears that this air is not expanded more by the powerful electric stream from this machine than by the common spark. Water would not absorb this electrified air, which was in part inflammable.

The following experiment is very curious, and may curiously illustrate some phenomena observed in thunder storms. Two balloons made of the allantoids of a calf, were filled with inflammable air, of which each contained about 2 cubic feet. To each of these was suspended, by a fullen thread about 8 feet long, such a weight as was just sufficient to prevent it from rising higher in the air: they were connected, the one with the positive, the other with the negative conductor, by small wires about 30 feet in length, and being kept near 20 feet under, were placed as far from the machine as the length of the wires would admit. On being electrified, these balloons rose up in the air as high as the wire allowed, attracted each other, and uniting as it were into one cloud, gently descended. The rising of these artificial clouds is ascribed to the expansion of the air they contained, in consequence of the repulsive force communicated to its particles by
electricity: when in contact, their opposite electrical powers destroyed each other, and they recovered their specific gravity by losing the cause of its diminution.

In order to render this experiment more perfectly imitative, the Doctor suspended to the balloon which was connected with the negative conductor, a bladder filled with a mixture of inflammable and atmospheric air, which, being kindled by the spark that took place on the union of the clouds, gave a considerable explosion. From these experiments, the Doctor explains the sudden elevation of the clouds, and the violent showers of rain and hail, which often accompany thunder-forms.

In the course of his experiments upon air and electric fluid, Dr. Priestley found, that, by means of the spark, he was able to turn vegetable blues to a red colour; though we are not to imagine that this was any indication of the acidity of the electric fluid, but merely of the decomposition of the air, and its conversion into fixed air or aerial acid. The instrument used in this experiment is a glass tube about 4 or 5 inches long and t or ¼ ths of an inch diameter in the inside; a piece of wire is put into one end of the tube, and fixed there with cement; a brass ball is placed on the top of this wire; the lower part of the tube is to be filled with water, tinged blue with a piece of turnsole or archil. This is easily effected, by letting the tube in a vessel of the tinged water, then placing it under a receiver on the plate of the air-pump; exhaust the receiver in part, and then, on letting in the air, the tinged liquor will rise in the tube, and the elevation will be in proportion to the accuracy of the vacuum; now take the tube and vessel from under the receiver, and throw strong sparks on the brass ball from the prime conductor.

When Dr. Priestley made this experiment, he perceived, that after the electric spark had been taken between the wire and the liquor about a minute, the upper part of it began to look red; 2 minutes it was manifestly so, and the red part did not readily mix with the liquor. If the tube was inclined when the sparks were taken, the redness extended twice as far on the lower side as on the upper. In proportion as the liquid became red, it advanced nearer to the wire, so that the air in which the sparks were taken was diminished; the diameter amounted to about ¼ th of the whole space; after which, a continuance of the electrification produced no sensible effect.

To determine whether the cause of the change of colour was in the air or in the electric matter, Dr. Priestley expanded the air in the tube by means of an air-pump, till it expelled all the liquor, and admitted fresh blue liquor in its place; but after this, electricity produced no sensible effect on the air or on the liquor; so that it was clear, that the electric matter had decomposed the air, and made it deposit something of an acid nature. The result was the same with wires of different metals. It was also the same when, by means of a bent tube, the spark was made to pass from the liquor in one leg to the liquor in the other. The air thus diminished was in the highest degree noxious.

In passing the electric spark through different elastic fluids, it appears of different colours. In fixed air, the spark is very white; in inflammable and alkaline air, it appears a purple or red colour. From hence we may infer, that the conducting powers of these airs is different, and that fixed air is a more perfect non-conductor than inflammable air.

The spark was not visible in air from a caustic alkali made by M. Lane, nor in air from spirit of salt: so that they seem to be more perfect conductors of electricity than water or other fluid substances.

The electric spark, taken in any kind of oil, produces inflammable air. Dr. Priestley tried it with ether, oil of olives, oil of turpentine, and essential oil of mint, taking the electric spark in them without any air to begin with; inflammable air was produced in them all.

Dr. Priestley found, that on taking a small electric explosion for an hour, in the space of an inch of fixed air, confined in a glass tube ¼ th of an inch diameter, when water was admitted to it, only ¼ th of the air was imbibed. Probably the whole would have been rendered immiscible in water, if the electrical operation had been continued a sufficient time.

The electric spark, when taken in alkaline air, appears of a red colour; the electric explosions, which pass through this air, increase its bulk; so that, by making about 200 explosions in a quantity of it, the original quantity will be sometimes increased 5 th. If water is admitted to this air, it will absorb the original quantity, and leave about as much elastic fluid as was generated by the electricity, and this elastic fluid is a strong inflammable air.

Dr. Priestley found, when the electric spark was taken in vitriolic acid air, that the inside of the tube in which it was confined was covered with a blackish sub stance. He seems to think, that the whole of the vitriolic acid air is convertible into this black matter, not by means of any union which it forms with the electric fluid, but in consequence of the concurrence given to it by the explosion; and that, if it be the calx of the metal which supplied the phlogiston, it is not to be distinguished from what metal, or indeed from what substance of any kind, the air had been extracted.

Dr. Priestley made 150 explosions of a common jar in about a quarter of an ounce measure of vitriolic acid air from copper, by which the bulk was diminished about ¼, and the remainder seemingly not changed, being all absorbed by water. In the course of this process, the air was carefully transferred three times from one vessel to another; and the last vessel, in which the explosions were made, was, to all appearance, as black as the first; so that the air seems to be all convertible into this black substance.

Thinking this diminution of the vitriolic acid air might arise from its abstraction by the cement with which the glass tubes employed in the last experiment were closed, he repeated it with the air from quicksilver, in a glass syphon confined by quicksilver, and the result was the same.

That this matter comes from the vitriolic acid air only, and not from any combination of the electric matter with it, will appear from the following experiment.

He took the simple electric spark from a conductor of a moderate size, for the space of 5 minutes without interruption, in a quantity of vitriolic acid
THE ELECTRICITY, etc.

Electrical Experiments.

air, without producing any change in the inside of the glass; when immediately after, making in it only two explosions of a common jar, each of which might be produced in less than a quarter of a minute with the same machine in the same state, the whole of the inside of the tube was completely covered with the black matter. Now, had the electric matter formed any union with the air, and this black matter had been the result of that combination, all the difference that would have arisen from the simple spark or the explosion, could only have been a more gradual or a more sudden formation of that matter.

A large phial, about an inch and a half wide, being filled with this air, the explosion of a very large jar, containing more than 2 feet of coated surface, had no effect upon it; from which it should seem, that in these cases the force of the shock was not able to give the quantity of air such a concussion as was necessary to decompose any part of it.

He had generally made use of copper, but afterwards he procured this air from almost every substance from which it could be obtained; the electric explosion taken in it produced the same effect. But as some of the experiments were attended with peculiar circumstances, he briefly mentions them as follows.

When he endeavored to get vitriolic acid air from lead, putting a quantity of leaden shot in a phial containing oil of vitriol, and applying only the usual degree of heat, a considerable quantity of heat was produced; but afterwards, though the heat was increased till the acid boiled, no more air could be got.

He imagined, therefore, that in this case the phlogiston had in fact been supplied by something that had adhered to the shot. However, in the air so produced, he took the electric explosion; and in the first quantity he tried, a whitish matter was produced, almost covering the inside of the tube; but in the succeeding experiments, with air produced from the same shot or from something adhering to it, there was less of the whitish matter; and at last nothing but black matter was produced, as in all the other experiments. Water being admitted to this air, there remained a considerable residuum, which was very slightly inflammable.

Vitriolic acid air is easily procured from spirit of wine, the mixture becoming black before any air is yielded. The electric explosion taken in this air also produced the black matter.

The experiments made with ether seem to throw most light upon this subject, as this air is as easily procured from ether as any other substance containing phlogiston. In the air produced by ether the electric explosion tinged the glass very black, more so than in any other experiment of the kind; and when water had absorbed what it could of this air, there was a residuum in which a candle burned with a lambent blue flame. But what was most remarkable in this experiment was, that besides the oil of vitriol becoming very black during the process, a black substance, and of a thick consistence, was formed, which swam on the surface of the acid.

It is very probable, that the analysis of this substance may be a means of throwing light upon the nature of the black matter formed by electric explosions in vitriolic acid air, as they seem to resemble one another very much.

The electric spark or explosion taken in common air, confined by quicksilver in a glass tube, covers the inside of the tube with a black matter, which, when heated, appears to be pure quicksilver. This, therefore, may be the case with the black matter into which he supposed the vitriolic acid air to be converted by the same process, though the effect was much more remarkable than in the common air. The explosion will often produce the diminution of common air in half the time that simple sparks will do, the machine giving the same quantity of fire in the same time: also, the blackness of the tube is much sooner produced by the shocks than by the sparks. When the tube considerably exceeds ⅛ of an inch in diameter, it will sometimes become very black, without any sensible diminution of the quantity of air.

Sect. X. Of the Methods of measuring Electricity both artificial and natural; of condensing and doubling it, so that the smallest Quantity may be made perceptible; of distinguishing the two Kinds of Electricity from one another, &c.

We have already had occasion to mention, and in part to explain, the instruments for this purpose named electrometers. When the electricity is very evident, many obvious contrivances may be fallen upon to determine its quality and strength, when compared with that of any other body electrified also to a considerable degree. But in many cases the quantity of electricity is so small that it does not discover itself by any of the ordinary electrometers; and in others, though the quantity be very great, yet we are destitute of any proper standard which might enable us to compare it with another of apparently the same height, or which might determine the degrees of charge which the electrified substance progressively receives.

In the former case, Dr Priestley recommends a single thread of silk as it comes from the worm; which being extremely light and flexible, very readily discovers the weight of the electric property of any body, by being first attracted and then repelled by it; and, as this substance at the same time has a power of retaining its electricity very strongly, we have thus an opportunity of determining whether the body from which it received the electricity was positive or negative. Even this electrometer has not been found to be endowed with all the sensibility to be wished for; so that others have been contrived which answer to a still greater degree of exactness. For ordinary purposes the following instruments are most commonly made use of.

Fig. 13. represents a stand supporting the electrometers D D, C C. B is the basis of it, made of common wood. A is a pillar of wax, glass, or baked wood. To the top of the pillar, if it be of wax or glass, a circular piece of wood is fixed; but if the pillar be of baked wood, that may constitute the whole. From this circular piece of wood proceed four arms of glass, or baked wood, suspending at their ends four electrometers, two of which D D are silk threads about eight inches long, suspending each a small downy feather.
The index of this plate is carried once round, when the arm \( B C \) has moved through 90 degrees, or a quarter of a circle. That motion is given to the index by the repulsive power of the charge acting between the ball \( D \) and the ball \( B \).

The arm \( B C \) being repelled, shows when the charge is increasing, and the arm \( F H \) shows what this repulsive power is between two balls of this size in grains, according to the number the weight rests when lifted up by the repulsive power of the charge: at the same time the arm \( B C \) points out the number of degrees to which the ball \( B \) is repelled; so that, by repeated trials, the number of degrees, answering to a given number of grains, may be ascertained, and a table formed from these experiments, by which means the electrometer, fig. 16, may be used without that of fig. 17.

Mr Brookes thinks, that no glass charged (as we call it) with electricity, will bear a greater force than that whose repulsive power, between two balls of the size he used, is equal to 60 grains; that in very few instances it will stand 60 grains weight; and he thinks it hazardous to go more than 45 grains.

Hence, by knowing the quantity of coated surface, and the diameter of the balls, we may be enabled to say, to what charged surface, with a repulsion between balls of so many grains, will melt a wire of such a size, or kill such an animal, &c.

Mr Brookes thinks, that he is not acquainted with all the advantages of this electrometer; but that it is clear, it speaks a language which may be universally understood, which no other will do; for though other electrometers will show whether a charge is greater or less, by an index being repelled to greater or smaller distances, or by the charge exploding at different distances, yet the power of the charge is by no means ascertained: but this electrometer shows the force of the repulsive power in grains; and the accuracy of the instrument is easily proved, by placing the weights on the internal ball, and feeling that they coincide with the divisions on the arm \( F H \), when the slide is removed to them.

Mr Achard has shown clearly, that if the scale of an electrometer is divided into equal parts (degrees for example), the angle at which the index is held suspended by the electric repulsion will not be a true measure of the repulsive force; to estimate which truly, he demonstrates that the arc of the electrometer should be divided according to a scale of arcs, the tangents of which are in arithmetical progression.

The electrometer of which this is an imitation was invented by Mr Brookes, and described in his treatise already quoted. An account of it is given in that treatise, along with a very full representation of it by plates; but as these are somewhat difficult to be understood, we must for further particulars refer to the treatise itself. On this electrometer, however, we must observe, that it is constructed on the only true principle on which machines for measuring the quantity of electricity can be made. The mere attraction of any light body shows indeed that the substance which attracts it is electrified; but this property is by no means calculated to discover the comparative strength of it, on account of

\[(k)\] These threads should be wetted in a weak solution of salt.
Methods of measuring electricity.

Mr. Cavallo's atmospheric electrometer.

The electricity of the atmosphere particularly, has engaged the attention of philosophers; and by reason of its infinitive variety, requires the most delicate instruments to observe its minuteness. Besides the kite formerly described, which was an invention of Dr. Franklin's, Mr. Cavallo has invented several others. Fig. 61, represents a portable atmospheric electrometer, the principal part of which is a glass tube $CDMN$, cemented at the bottom into the brass piece $AB$, by which part the instrument is to be held when used for the atmosphere; and it also serves to screw the instrument into its brass case $ABC$. The upper part of the tube $CDMN$ is shaped tapering to a small extremity, which is entirely covered with sealing-wax; to this tapering part a small tube is cemented; the lower extremity, being also covered with sealing-wax, projects a small way within the tube $CDMN$; into this smaller tube a wire is cemented, which with its under extremity touches the flat piece of ivory $H$, fastened to the tube by means of a cork; the upper extremity of the wire projects about a quarter of an inch above the tube, and serves into the brass cap $EF$, which cap is open at the bottom, and serves to defend the waxed part of the instrument from the rain, &c.

$IM$ and $KN$ are two narrow slits of tin-foil, stuck to the inside of the glass $CDMN$, and communicating with the brass bottom $AB$. They serve to convey that electricity which, when the balls touch the glass, is communicated to it, and being accumulated, might disturb the free motion of the balls.

To use this instrument for artificial electricity, electrify the brass cap by an electrified substance, and the divergence or convergence of the balls of the electrometer, at the approach of an excited electric, will show the quality of the electricity. The better manner to electrify this instrument is, to bring excited wax so near the cap that one or both of the corks may touch the side of the bottle $CDMN$, after which they will soon collapse and appear electrified. If now the wax is removed, they will again diverge, and remain electrified positively.

When this electrometer is to be used to try the electricity of the fogs, air, clouds, &c. the observer is to do nothing more than to unscrew it from its case, and hold it by the bottom $AB$, to prevent it to the air a little above his head, so that he may conveniently see the balls $P$, which will immediately diverge if there is any electricity; i.e., whether positive or negative may be ascertained, by bringing an excited piece of sealing-wax or other electric towards the brass cap $EF$.

An improvement of Mr. Cavallo's electrometer has been made by M. Saffire. The principal circumstances in which they differ are, 1. The fine wires by which the balls are fastened, should not be long enough to reach the tin-foil which is pasted on the inside of the glass; because the electricity, when strong, will cause them to touch this tin-foil twice consecutively, and thus deprive them in a moment of their electricity. To prevent this defect, and yet give them a measuring sufficient degree of motion, it is necessary to use larger glasses than those that are generally applied to Mr. Cavallo's electrometer; two or three inches diameter will be found to answer the purpose very well. But as it is necessary to carry off the electricity which may be communicated to the inside of the glass, and thus be confounded with that which belongs to those substances that are under examination; four pieces of tin-foil should be pasted on the inside of the glass; the balls should not be more than a 12th of an inch diameter, suspended by silver wire, moving freely in holes nicely rounded. The bottom of the electrometer should be of metal; for this renders it more easy to deprive them of any acquired electricity, by touching the bottom and top at the same time.

This electrometer may be used instead of the conservators in the determination of M. Volta, by only placing it on a piece of lead of M. Volta's invented denser.

By this instrument, it is easy to ascertain the degree of conducting power in any substance. For example, the conducting power of marble, or and if the instrument is electrified strongly, and afterwards the top is touched, the electricity will appear to be destroyed; but on lifting up the instrument by the top, the balls will again open, because the imperfect conductor formed with the base a kind of electrophorus, by which the electric fluid was condened, and lost its tension, till the perfect conductor was separated from the imperfect one; whereas, if the conductor had been more perfect, it would have been deprived of its electricity immediately on the application of the hand.

It is easy to discover also, by this instrument, the electric electricity of any substance, as of cloaths, hair of different animals, &c. For this purpose, it must be held by the base, and the substance rubbed briskly (only once) by the ball of the electrometer; the kind of electricity may be ascertained in the usual manner. It is proper, however, to observe here, that as the top of the electrometer acts in this case as an insaluble rubber, the electricity it acquires is almost always contrary to that of the rubber body.

In order to collect a great quantity of electricity How to on this electrometer, the electrometer is furnished with a pointed wire 1/2 inches or two feet long, which unforms in three or four pieces, to render the instrument more great quantity of portable; see fig. 62. When it rains or snows, the atmospheric small cover, fig. 63, is to be screwed on the top of the instrument, as by this its insulation is preferred, notwithstanding the rain.

This instrument indicates not only the electricity of Or to affirmative of serene weather, and enables us to ascertain the A conductor exhibits signs of electricity only when the
The electric fluid is more or less condensed in the air than in the earth. Though the air retards the passage of the electric fluid, it is not absolutely impermeable to it; it allows it to pass through; and generally with more safety in proportion as its mass or thickness is less.

It is therefore interesting to discover at what height it is necessary to be elevated, in order to find a sensible difference between the electricity of the earth and that of the air. A very sensible difference may be generally discovered by this instrument at the distance of four or five feet from the ground; sometimes it may be seen if the instrument is placed even on the ground, while at others it must be raised seven or more feet before the balls will open; sometimes, though seldom, this height is not sufficient. This distance is generally greatest when the electricity is strongest, though necessarily modified by a variety of circumstances, some of which are known, as the degree of dryness or humidity of the air, and others are unknown.

The degree of intensity, at a given height, may be discovered thus: raise the electrometer, and judge by the divisions which are placed on the edge thereof the degree of their divergence. To find the relation between this degree of divergence and the force of the electricity, M. Sauffre took the following method: As he could not with certainty double or triple a given quantity of electricity; yet as a given force may be reduced one half, a fourth, or eighth, &c. by dividing it between two equal and similar bodies, the electricity contained in one, he took two of his unarmcd electrometers, which were as similar as possible, and electrified one of them, so that the balls separated precifely 6 lines: he then touched the top thereof by the top of that which was not electrified; in an instant the electricity was equally divided between them, as was evident by the divergence of the balls, which was 4 lines in each; consequently, a diminution of half the density had only lessened the divergence one third. One of these electrometers was then deprived of its electricity, and was afterwards brought in contact with the other, as before; the remaining electricity divided itself again between them, and the balls fell from 4 to 28 lines, nearly in the same proportion as before; in the third operation they fell to 19; in the fourth to one, where he was obliged to stop, as there was not now sufficient force in the fluid to pass from one electrometer to the other, and distribute itself uniformly between them. The same experiment repeated several times gave very nearly the same results. Negative electricity decreased also in the same proportion as the positive. The following table may therefore be considered as giving a general, though not exact, idea of the increase in force, which corresponds to different degrees of divergence in the balls; it is only calculated to every fourth of a line: the force of electricity is always expressed by whole numbers, as it would be ridiculous to put a greater degree of exactness in the numbers than is to be found in the experiments which form the basis of the calculation (1).

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<th>Distance of the balls in fourths of a line.</th>
<th>Corresponding forces of electricity.</th>
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Those who are desirous to carry this measure of the electric force further, may do it by having similar electrometers constructed, but made upon a larger scale, and with heavier balls, which would only separate one line, with the degree of electricity that makes the smaller ones diverge 6 lines; these would consequently measure a force 1024 times greater than that which forms the unity of the preceding table; and thus by degrees we may be enabled to discover the ratio of the strongest discharge of a great battery, or perhaps even of thunder itself, to that of a piece of amber, which only attracts a bit of straw or any other light substance. (m).

(1) M. Sauffre, in a long note, anticipates the objections that may be made to the foregoing method of estimating the force of electricity; but as at the most they only show that this science is at present in state of considerable imperfection, it will be unnecessary to take notice of them here.

(m) The consideration of the repulsive force is not sufficient to discover the absolute force of an explosion or electrical discharge: for M. Volta has shown, that the force of a discharge depends principally on the quantity of the electric fluid which passes from one body to another. Now the repulsive force of the electrometer only indicates the ratio of this quantity in equal and similar bodies, and which are also similarly situated. If equal quantities of the electric fluid were imparted to two unequal and separate conductors, the electric fluid being less condensed on the largest, would act with the least force on the electrometer; though it is probable, the force of the discharge in the two conductors would be equal. The repulsive force serves, however, to show what M. Volta calls the electrical capacity of a body, the quantity of the electric fluid it actually contains, or is capable of containing. To effect this, and have points of comparison, we should use light metallic balls, of different sizes, suspended by silk thread. One of these balls, unelectrified, being brought into contact with the
Methods of measuring electricity.

How to observe the electricity of the atmosphere.

How to render the signs of electricity in the electrometer permanent.

How to distinguish the two electrics.

Methods of measuring electricity. In order to observe the electricity of the atmosphere with this instrument, we must first bring the electric fluid contained in the electrometer to the same degree of density with that at the surface of the earth; this is easily done by letting the bottom and top touch the ground at the same time; then raise the point, keeping the bottom still in contact with the ground, from whence it may be lifted up in a vertical position till the balls are level with the eye.

The second circumstance is to render the divergence of the balls, which is occasioned by the electricity of the air, permanent. This is effected by touching the top of the electrometer with the finger: but here the acquired electricity becomes contrary to that of the body by which they are electrified. Let us suppose, for example, that the electrometer is at five feet from the ground, and the balls diverging; touch the top of the electrometer with the finger, and the balls will close; but they will again open if the electrometer is withdrawn from the influence of the electricity of the air, by being brought nearer the ground, or into the house. M. Saufore, only employed this method when the electricity was so weak that he could not perceive any until the electrometer was raised considerably above his eye; as in this case he could not perceive the divergence of the balls, he always endeavored to obtain a permanent electricity in the foregoing manner.

To know whether the balls separate with positive or negative electricity, bring a piece of excited wax gradually near the top of the electrometer; if the balls separate further on the approach of the wax, they are negatively electrified, or of the same nature with the electricity of the wax; if on the other hand they come nearer together on the approach of the wax, then the electricity is positive, or in a contrary state to that of the wax. If glass be used, the results will be exactly the reverse of the preceding.

The following example will render the use of the foregoing observations more familiar. Choose an open situation free from trees and houses, ferew the conductor on the top of the electrometer, lay hold of it by its base, and place it so that the base and conductor may touch the ground at the same time; then elevate it to the height of the eye, and observe the quantity of lines, or fourths of a line, that the balls have diverged; now lower it till the balls almost touch each other, and observe at what distance the top of the conductor is from the ground; and this is the height from the ground at which the electricity of the air begins to be sensible. If the electricity of the air is sufficiently strong to make the balls diverge when it stands upon the ground, one of the lengths of the electric fluid contained in the electrometer must be unscrewed from it. If the balls however, ever still diverge, the other parts of the conductor should also be unscrewed, and you may mark down, that the electricity is sensible at zero, or on the surface of the earth. If, on the contrary, the electricity is so weak, as not to cause the balls to diverge when they are even with the eye, and consequently when the conductor is two feet higher, or seven feet from the ground, you should then raise it a foot higher; while it is thus elevated, touch the top with the other hand; when this hand is taken away, lower the electrometer, and if it is electrified you may say the electricity is sensible at eight feet; if it is not, raise it as high as the arm can reach, and repeat the same operation, if any electricity is found, write down electricity sensible at nine feet; if not, mark off, or no electricity relative to this instrument, and this mode of employing it; for signs of electricity may still be obtained, by throwing a metallic ball 50 or 60 feet into the air, which is at the same time connected with the electrometer by a metallic thread.

One advantage of this instrument is, that it will often exhibit signs of electricity when none can be obtained from a conductor of 100 feet in height, because it can more easily be preserved from humidity, &c. which destroy the infusion of the large conductors.

Aerial electricity varies according to the situation; it is generally strongest in elevated and insulated situations, not to be observed under trees, in streets, in houses, or any enclosed places; though it is sometimes to be found pretty strong on quays and bridges. It is also not so much the absolute height of the place as their situation; thus a projecting angle of a high hill will often exhibit a stronger electricity than the plain at the top of the hill, as there are fewer points in the former to deprive the air of its electricity.

The intensity of the atmospheric electricity is varied by a great many circumstances, some of which may be easily accounted for, others with more difficulty. When the weather is not serene, it is impossible to assign any rule for their variation, as no regular correspondence can then be perceived with the different hours of the day, nor with the various modifications of the air. The reason is evident; when contrary and variable winds reign at different heights, when clouds are rolling over clouds, these winds and clouds, which we cannot perceive by any exterior sign, influence however the strata of air in which we make our experiments, produce these changes of which we only see the result, without being able to assign either the cause or its relation.

Substance whose electricity is to be explored, will diminish the tension or repulsive force of this substance; and the quantity diminished by the contact of the ball will give the ratio of the capacity of this substance with that of the ball. Let us suppose a Leyden phial uninsulated, but so concealed, that only the knob is visible, and we are therefore ignorant of its size, and the strength of the shock it will give. Let the top of M. Saufore's electrometer be in contact with the knob of the bottle, and the balls of the electrometer separate 6 lines, from this solitary fact, we shall gain no information relative to the force of the shock; because, if the jar is very large, this degree of tension will give a very painful sensation; when, if it is very small, with the same indicated tension, the sensation may be almost imperceptible. But if we bring a ball of a foot diameter, in contact with the knob of the bottle, and after having thus taken a part of the fluid therefrom, the electrometer is again put in contact with the knob thereof, the remaining quantity of repulsive force will show the relation between its contents and that of the globe of metal, and by this means the intensity of its charge.
the hygrometer and
its former force; one instant positive, the next negative, without being able to assign any reason for these changes. M. Sauriure says, that he has seen these changes succeed with such rapidity, that he had not time to note them down.

When rain falls without a storm, these changes are not so sudden; they are, however, very irregular, particularly with respect to the intensity of force; the quality thereof is more constant. Rain or snow almost uniformly gives positive electricity.

In cloudy weather, without rain or storms, the electricity follows generally the same laws as in serene weather.

Strong winds generally diminish its intensity; they mix together the different strata of the atmosphere, and make them pass successively towards the ground, and thus distribute the electricity uniformly between the earth and the air. M. Sauriure has observed a strong electricity with a strong north wind.

The state of the air in which the electricity is strong, is foggy weather: this is always accompanied with electricity, except when the fog is going to resolve into rain.

The most interesting observations, and those which throw the greatest light upon the various modifications of electricity in our atmosphere, are those that are made in serene weather. In winter (during which most of M. Sauriure's observations were made) and in serene weather, the electricity was generally weakest in an evening, when the dew had fallen, until the moment of the sun's rising; its intensity afterwards augmented by degrees, sometimes sooner and sometimes later; but generally before noon, it attained a certain maximum, from whence it again declined, till the fall of the dew, when it would be sometimes stronger than it had been during the whole day; after which, it would again gradually diminish during the whole night; but it is never quite destroyed, if the weather is perfectly serene.

Atmospherial electricity seems, therefore, like the sea, to be subjected to a flux and reflux, which causes it to increase and diminish twice in 24 hours. The moments of its greatest force are some hours after the rising and setting of the sun; when it is weakest, precede the rising and setting thereof.

M. Sauriure has given an instance of this periodic flux in electricity: On the 22d of February, 1785, (one of the coldest days ever remembered at Geneva,) the hygrometer and thermometer were suspended in the open air on a terrace exposed to the south-west; the electrometer, from its situation, indicated an electricity equal to what it would have shown if it had been pitched on an open plain. The height of the barometer was reduced to what it would have been if the mercury had been constantly at the temperature of 10 degrees of Reamur's thermometer. The place of observation was elevated 60 feet above the level of the lake. The observations of the day preceding and following this great cold were marked down by him; because it is pleasing to have these which precede and follow any singular phenomena. There was a weak S.W. wind during the whole three days; and it is rather remarkable, that most of the great colds, which have been observed at Geneva, were preceded by, or at least accompanied with, a little S. W. breeze.

From the first 18 observations made during these three days, when the sky was quite serene, we learn, that the electricity was pretty strong at nine in the morning; that from thence it gradually diminished till towards six in the evening, which was its first maximum; after which it increased again till eight, its second maximum; from whence it again gradually declined till six the next morning, which was the time of its second minimum; after which it again increased till ten in the morning, which was the first maximum of the following day; as this was cloudy, the electric periods were not so regular.

The electricity of serene weather is much weaker in summer than in winter, which renders it more difficult to observe these gradations in summer than in winter; besides a variety of accidental causes, which at the same time renders them more uncertain. In general, in summer, if the ground has been dry for some days, and the air is dry also, the electricity increases from the rising of the sun till three or four in the afternoon, when it is strongest; it then diminishes till the dew begins to fall, which again reanimates it; the after this it declines, and is almost extinguished during the night.

But the serene days that succeed rainy weather in summer, generally exhibit the same diurnal periods or states of electricity, as are to be observed in winter.

The air is invariably positive in serene weather, both in winter and summer, day and night, in the sun or in the shade. It would seem therefore, that the electricity of the air is essentially positive, and that whenever it appears to be negative, in certain rains or in storms, it probably arises from some clouds, which have been exposed to the pressure of the electric fluid contained in the upper part of the atmosphere, or to more elevated clouds that have discharged a part of their fluid upon the earth, or upon other clouds.

In order to find out the cause of these phenomena, M. Sauriure instituted a set of experiments on evaporation, avoiding the use of M. Volta's condenser.

To produce a strong evaporation, he threw a mass of Sauriure's red-hot iron into a small quantity of water, which was contained in a coffee-pot with a large mouth, and suspended by silk firings; by this he obtained a strong positive electricity; though, according to M. Volta's system, it ought to have been negative: the experiment was repeated several times, varying some of the circumstances, but the result was always the same: As it was not easy to think so able a philosopher as M. Volta was deceived, it was necessary to try the experiment in a manner more analogous to that of M. Volta. A small chafing-dish was therefore inflated by silk cords, and the coffee-pot, with a small quantity of water, placed on it; one electrometer was connected with the coffee-pot and another with the chafing-dish; the fire was raised by a pair of bellows; when the water had boiled strongly for a few minutes, both electrometers exhibited signs of electricity, which, on examination, was found to be negative; proving the truth of M. Volta's experiment.
The evaporation produced by the effervescence of iron in the vitriolic acid, and by that of chalk in the same acid, gave also negative electricity.

It was now necessary to inquire, why the vapour, excited by the heated iron, produced positive electricity; while that from boiling water in any other way produced a negative electricity.

M. Saffure suspected, that the intensity of heat to which the water is exposed, by the contact of a body in a state of incandescence, was the cause of the electricity produced by its evaporation; and that a combination was then formed, by which a new quantity of the electric fluid was produced. This conjecture may at first sight seem impossible; but the quantity of electricity produced by this experiment will astonish those that repeat it: and this quantity is the more surprising, because, if it is true, according to the system of M. Volta, that the waters absorb, while they are forming a quantity of the electric fluid, there must, therefore, be enough developed in this experiment for the formation of the great quantity of vapours produced by the heated iron, and afterwards a sufficient quantity to electricity strongly the apparatus, and all the vapours.

This experiment shows clearly the cause of that prodigious quantity of electricity which is unfolded in the eruption of volcanos; as it is probable that the water in these, from many circumstances, acquires a much greater degree of heat than is given to it in our experiments.

To verify this conjecture, that it was in some measure the combustion of the water or the iron that produced the positive electricity, it was proper to try whether, by a regular moderation of the heat of the iron, positive electricity would always be obtained. This was essayed in the following manner: A large iron crucible, five inches high, four in diameter, and five lines thick, was heated red hot, then inflated; after which, small quantities of water were thrown into it, each projection of the water cooling more and more the crucible; thus defending by degrees till there was only sufficient heat to boil the water; carefully observing, and then destroying, the electricity produced at each projection. The electricity was always positive or null; at the first projections it was very strong; it gradually diminished to the twelfth, when it was scarcely sensible, though always with a tendency to be positive.

On repeating this experiment, and varying it in different ways, a remarkable circumstance was observed: When a small quantity of water was thrown into the crucible, the moment it was taken from the fire, while it was of a pale red, approaching what is called the white heat, no electricity was obtained.

This fact seemed to have some connection with another mentioned by Malfchenbroek, that water evaporates more slowly on a metal, or any other incandescent body, than on the same body, heated only a small degree above boiling water. To examine this relation, and to find whether there was any between the periods of evaporation and the production of electricity, M. Saffure made a great number of experiments, which are most accurately described in his work; but as the detail would be much too long, we shall only present the reader with the heads thereof, and a description of the apparatus.

The apparatus consisted of a pot of clay, well baked or annealed, 15 lines thick and 4 inches diameter; this was inflated by a dry glass goblet; upon this pot was placed the crucible, or any other heated substance on which the water was to be thrown, in order to be reduced into vapour; the crucible was contiguous to a wire connected with an electrometer; a measure, containing 54 grains weight of distilled water, was thrown upon the heated crucible: the time employed in the evaporation thereof was observed by a second watch; the electricity produced by this evaporation was noted. When this measure of water was reduced into vapour, the electricity of the apparatus is destroyed, and a fresh measure of water is thrown into the crucible, proceeding in the same manner till the crucible is almost cold.

The first experiment was with an iron crucible, from which it was found that Malfchenbroek was not right in saying that the evaporation was slowest when the iron was hottest; for at the instant it was taken from the fire, it required 19 seconds to evaporate the water, and took no more time till the third projection, when it took 35 seconds, though from that period it employed less time, or in other words, the evaporation accelerated in proportion as the iron cooled.

With respect to the electricity, it was at first, then positive, afterwards negative, then positive, and afterwards positive to the end of the experiment. The vapour not visible till the 7th projection.

In the second experiment with the same crucible, though every endeavour was made not to render them as similar as possible, the electricity was constantly positive.

The third experiment was with a copper crucible; here also the electricity was positive; and the longest time employed in evaporation was not the instant of the greatest heat. It was very curious to see the water endeavouring to gather itself into a globule, like mercury on glass, to be sometimes immovable, and then to turn en itself horizontally, with great rapidity; sometimes throwing from some of its points a little jet, accompanied with a hissing noise.

The fourth experiment was with the same crucible: the electricity was at first negative; then constantly positive.

The fifth was with a crucible of pure silver: a considerable time was employed here in evaporating the same quantity of water; even in the instant of the greatest heat it took 5 minutes 6 seconds; the electricity was weak; three times no electricity was perceived; five times negative electricity was discovered.

In a sixth experiment with the same crucible, a positive electricity was obtained at the second projection, after which none of any kind was perceived. The seventh with the same gave at first a strong negative electricity; the second and third projection gave a weak positive electricity.

The eighth was made with a porcelain cup: here the evaporation was slower at the second than at the first projection; but from this it took longer time till it was cold.
ELECTRICITY.

Methods of measuring electricity were always negative.

The eleventh experiment was with spirits of wine in a silver crucible: there was no electricity produced at the two first projections, and what was afterwards obtained was negative.

Twelfth experiment with ether: here the electricity was also negative. These two inflammable fluids in evaporation, followed the same laws as water, being dissipated at first most rapidly in the greatest heat, afterwards taking a longer and longer time before they were evaporated to a certain period, then employing less time, or evaporation quicker, till the crucible was nearly cold.

Now as china and silver always produced negative electricity, while iron and copper have generally given positive electricity, we may conclude, that electricity is positive with those bodies that are capable of decomposing water, or of being decomposed themselves by their contact with the water; and negative with those which are not at all decomposed or altered.

From hence M. Sauvure conjectures, that the electric fluid may be looked upon as formed by the union of fire with some unknown principle, perhaps a fluid analogous to inflammable air, but exceedingly more subtle. This analogy seems to him sufficiently proved by the inflammation of the electric fluid, and by the diminution of the air in which this inflammation is made. Though many doubts have been attempted to be thrown on this inflammation, there seems to be one reason which forces us to admit it, which is the loss of a quantity of fluid at every spark; we may diminish at pleasure any quantity of this fluid by taking a number of sparks from it. From whence also it may be inferred, that a considerable quantity is destroyed every day by thunder.

According to this system, when the operation, which converts water into vapour, proceeds at the same time a decomposition, it then generates the electric fluid. A part of this fluid combines itself immediately with these vapours, and serves even to form them. The vessel in which this operation is performed, will acquire a positive electricity, none at all, or a negative, according as the quantity of the fluid generated is superior, equal, or inferior to that which the formation of the vapour consumes. When no decomposition accompanies the evaporation, the electricity ought to be constantly negative, because there is nothing to replace the quantity of this fluid which is employed in forming the vapour.

If in the foregoing experiments, those substances which were susceptible of calcination had constantly given a positive electricity, and those which do not calcine had always given the negative, every thing would have been explained by these principles, and they would have acquired a greater degree of probability: but the phenomena have not always followed this law. We have seen iron and copper sometimes give a negative electricity, and silver the positive. The first case is not difficult to account for; it is well known with what facility iron and copper calcine in a brisk fire; they become covered with a scaly crust, which is not susceptible of any further alteration with the same heat. If the bottom of the crucible acquires measuring this crusty coating, the drop of water placed therein may be no longer in communication with the fluid; there will be no further decomposition, no generation of the electric fluid: the vapours, however, which are still formed, will absorb a part of the fluid naturally contained in the apparatus, and this will therefore be electrified negatively. If some of the scales should be so far detached, that the water may gain some points of contact, the quantity thus generated may compensate for what is absorbed by the vapours, and thus the electricity will be null. If more are detached, it will superabound and be positive. For the same reasons, a large mass of water, by attracting the iron in a greater number of points, always gives positive electricity; and hence, also, a strong positive electricity is obtained, by throwing a piece of red-hot iron into a mass of water.

It is not so easy to explain why silver gives sometimes a positive electricity, but by supposing it to have been mixed with some substances capable of calcination; and this the more, as the white porcelain always gave negative electricity. This supposition was verified by some subsequent experiments, in which the same silver, when purified, always gave a negative electricity.

M. Sauvure owns himself incapable of explaining why heated charcoal always gives a negative electricity; unless it can be attributed to the promptitude with which so rare a substance loses its heat by the contact of water.

One fact suffonified him, namely, that by combustion properly so called, although it is an evaporation, and the highest degree of evaporation, he never obtained any signs of electricity, though he tried to obtain it in a variety of ways. Probably the current produced by the flame dippers and dilates the electricity as soon as it is formed. The cafl, however, must not be looked on in general, because M. Volta obtained signs of electricity from bodies in combustion by means of his condenser.

Another singular fact was, his not being able to obtain electricity without ebullition, though he endeavoured to compensate by the quantity of surface for the quantity of vapours that were elevated by boiling water; and indeed, the same quantity of water, if extended over too large a surface, will not give any electricity.

But all of the instruments by which it had been attempted to measure electricity, none have been found to answer the purpose equally well with that invented by Mr. Bennet, of which an account is given in the 7th volume of the Philosophical Transactions, and which is represented fig. 64. It consists of two slips of leaf-gold, $a, a,$ suspended in a glass cylinder $b.$ The foot $c$ may be made of wood or metal, and the cap $d$ of metal; the latter being made flat at top for the convenience of putting any thing upon it that is to be electrified. The cap is about an inch wider than the diameter of the glass, and its rim about three quarters of an inch broad, hanging parallel to the glass to keep it sufficiently inflated, and to turn off the rain. Within this is another circular rim about half as broad as the former, lined with silk or velvet, to that
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Methods of it may be made to fit the outside of the glafs exactly, while the cap may be easily taken off to repair any accident happening to the gold-leaf. From the centre of the cap hangs a tin tube somewhat longer than the depth of the inner rim, in which a small peg is placed, which may be taken out occasionally. To this peg, which is rounded at one end and flat at the other, two dips of leaf-gold are fastened with paste, gum-water, or varnish. These are about a fifth-part of an inch broad, and two inches long, tapering to a sharp point. In one side of the cap is a small tube, to place wires in; \( bb \) are two long pieces of tin-foil fastened with varnish on opposite sides of the internal surface of the glafs, where the leaf-gold may be expected to strike, and in connection with the foot. The upper end of the glafs is covered and lined with sealing-wax as low as the outermost rim, to make the inflation more perfect. An improvement on this electrometer is to make the cylinder pretty long, and to have a small additional tube of gum-lac on the end of it. The dips of tin-foil reach almost to the edge of the outer rim, and are sharpened at top; widening in the middle, and decreasing in breadth again as they descend.

The sensibility of this electrometer is extreme, as appears from the following examples.

1. On putting powdered chalk into a pair of bellows, and blowing it upon the cap, the latter was electrified positively when the nozzle of the bellows was about six inches from it; but at the distance of three feet from the nozzle, the same stream electrified it negatively. Thus it appears that the electricity may be changed from positive to negative from the mere circumstance of the wider diffusion of this stream of chalk in the air. It may also be changed by placing a bunch of fine wire, silk, or feathers, in the nozzle of the bellows; and it is likewise negative when blown from a pair of bellows without their iron-pipe, so that it may come out in a larger stream; but this last experiment was found to answer best in wet weather. There is likewise a remarkable difference between the experiment in which the electricity is positive and that in which it is negative; the former being communicated with some degree of permanency to the cap, so that the gold-leaf continues for some time to diverge; but the latter being only momentary, and the gold-leaf collapsing as soon as the cloud of chalk is dispersed. The reason why the former continues is, that the chalk sticks to the cap.

2. A piece of chalk drawn over a brush, or powdered chalk put into the brush, and projected upon the cap, electrifies it negatively; but its electricity is not communicated.

3. Powdered chalk blown with the mouth or bellows from a metal plate placed upon the cap, electrifies it permanently positive. Or if the chalk is blown from the plate, either inflated or not, so that the powder may pass over the cap, if not too far off, it is also positive. Or if a brush is placed upon the cap, and a piece of chalk drawn over it, when the hand is withdrawn, the leaf-gold gradually opens with positive electricity as the cloud of chalk disperses.

4. Powdered chalk falling from one plate to another placed upon the instrument, electrifies it negatively.

Other methods of producing electricity with chalk and other powders have been tried; as projecting Methods of chalk from a goose wing, chalking the edges of books measuring and clapping the book suddenly together, also filling the powder upon the cap; all which electrified it negatively: but the instrument being placed in a dusty room, and the dust stuck up with a stick near it, electrified it positively. Breaking the glass-leaf upon a book electrified it negatively, but when broken in water, it did not electrify it.

Wheat-flour and red-lead are strongly negative in all cases where the chalk is positive. The following powders were like chalk: red ochre and yellow rosin, coal ashes, powdered coccus metallorum, surum mosaicum, black-lead, lampblack (which was only sensible in the two first methods), powdered quick lime, humber, lapis calaminaris, Spanish brown, powdered sulphur, flowers of sulphur, iron-filings, rust of iron, &c. Roin and chalk, separately alike, were changed by mixture; this was often tried in dry weather, but did not succeed in damp; white lead also sometimes produced positive and sometimes negative electricity when blown from a plate.

If a metal cup be placed upon the cap with a red-hot coal in it, a spoonful of water thrown in electrifies the cap negatively; and if a bent wire be placed in the cap, with a piece of paper fastened to it to increase its surface, the positive electricity of the ascending vapour may be tried by introducing the paper into it. Perhaps the electrification of fog and rain is well illustrated by pouring water through an infalinated cylinder containing hot coals, where the ascending vapour is positive and falling drops negative.

The sensibility of this electrometer may be considerably increased by placing a candle upon the cap. By this means, a cloud of chalk, which in the other case only just opens the leaf-gold, will cause it to strike the sides for a long time together; and the electricity, which was not before communicated, now passes into the electrometer, causing the leaf-gold to repel after it is carried away. Even sealing-wax by this means communicates electricity at the distance of 12 inches at least, which it would scarcely otherwise do by rubbing upon the cap.

A cloud of chalk or wheat flour may be made in one room, and the electrometer with its candle be afterwards leisurely brought from another room, and the cloud will electrify it before it comes very near. The air of a room adjoining to that wherein the electrical machine was used, was very sensibly electrified, which was perceived by carrying the instrument through it with its candle.

In very clear weather, when no clouds were visible, its application to the floating fringing of kites without metal, and their positive electrical electricity caused the leaf-gold to strike the sides; but when a kite was raised in cloudy weather with a wire in the fringing, and when it gave sparks about a quarter of an inch long, the electricity was sensible by the electrometer at the distance of ten yards or more from the fringing; but when placed at the distance of six feet, the leaf-gold continued to strike the sides of the electrometer for more than an hour together, with a velocity increasing and decreasing with the density or distance of the unequal clouds which passed over.

Sometimes the electricity of an approaching cloud has...
Methods of measuring Electricity, &c.

Other experiments, showing the great sensibility of this electrometer.

A book was placed upon the cap, and struck with silk, linen, woollen, cotton, parchment, and paper, all which produced negative resolution; but when the other side of the book was struck with silk, it became positive; this side, struck at right angles with the former, was again negative; and by continuing the strokes which produced positive, it changed to negative for a little while; and by turning again, became positive. No other book would do the same, though the sides were scraped unchalked, upon a supposition that altering the surface would produce it. At last, one side of a book was moistened, which changed it; whence it was concluded, that one edge of the book had lain in a damp place; which conjecture was far confirmed by all the books becoming positive in damp weather, and one of them being dried at the fire again became negative.

When the cap is approached with excited sealing-wax, the leaf-gold may be made to strike the sides of the glass more than twelve times; and as the sealing-wax recedes, it strikes nearly as often; but if it approaches much quicker than it recedes, the second number will sometimes be greater.

The quantity of electricity necessary to cause a repulsion of the leaf-gold is so small, that the sharpest point or edges do not draw it off without touching; hence it is unnecessary to avoid points or edges in the construction of this instrument.

To the experiments on blowing powders from a pair of bellows it may be added, that if the powder is blown at about the distance of three inches upon a plate which is moistened or oiled, its electricity is contrary to that produced by blowing upon a dry plate. This shows that the electricity of the streams of powder issuing from the bellows is only contrary to the more expanded part, because it is within the influence of its atmosphere; for when this is destroyed by the adhesion of the powder to the moistened plate, it is negative when the bellows are positive, as it was before positive when the more expanded cloud was negative.

The experiments on evaporation of water may be tried with more ease and certainty of success by heating the small end of a tobacco-pipe, and pouring water into the head; which running down to the heated part, is suddenly expanded, and will show its electricity when projected upon the cap of the electrometer more sensibly than any other way that has been tried. If the pipe be fixed in a cloven stick, and placed in the cap of one electrometer while the stream is projected upon another, it produces both electrifications at once. Spirit of wine and ether are electrified like water. Oil and vitriolic acid produced smoke without any change of electricity. In these experiments a long pipe is better than a short one.

Besides these instruments, there are several others invented by Mr. Cavallo which answer the purpose of observing the electricity of the atmosphere extremely well, tho' not with such great accuracy as that just now described, and of which he gives the following account.

"Fig. 67," represents a very simple instrument for making experiments on the electricity of the atmosphere; and which, on several accounts, seems to be the most proper for that purpose. \(A B\) is a common jointed filling rod, without the left or smallest joint. From the extremity of this rod proceeds a slender glass tube \(C\), covered with sealing-wax, and having a cork \(D\) at its end, for which a pinch-ball electrometer is suspended. \(H C I\) is a piece of twine fastened to the other extremity of the rod, and supported at \(G\) by a small spring \(F G\). At the end \(I\) of the twine a pin is fastened; which when pushed into the cork \(D\), renders the electrometer \(E\) uninflected. When I would observe the electricity of the atmosphere with this instrument, I thrust the pin \((I)\) into the cork \(D\); and holding the rod by its lower end \(A\), project it out from a window in the upper part of the house, into the air, raising the end of the rod with the electrometer, so as to make an angle of about 45° or 60° with the horizon.

In this situation I keep the electrometer for a few seconds; and then pulling the twine at \(H\), the pin is disengaged from the cork \(D\), which operation causes the string to drop in the dotted situation \(K L\), and leaves the electrometer inflected, and electrified with an electricity contrary to that of the atmosphere. After this experiment, I draw the electrometer into the room; and examine the quantity of the electricity without obstruction either from wind or darkness. With this instrument I have made observations on the electricity of the atmosphere several times in a day for several months."

His electrometer for rain is shown Plate CLXXXVII. His electrometer, fig. 70, and of this he gives the following description.
Methods of measuring Electricity &c., 319

All these instruments imperfect.

Mr. Cavallero's dissertation on measuring small degrees of electricity.

Volta's condenser.

Mr. Benner's doubler objected to.

Methods of served, that the rain is generally, though not always, electrified negatively; and sometimes so strongly, that I have been able to charge a small coated phial at the wire $AG$. This instrument should be fixed in such a manner that it may be easily taken off from the window and replaced again as occasion requires; for it will be necessary to clean it very often, particularly when a shower of rain is approaching."

Notwithstanding the great accuracy of these instruments, however, there are still many degrees of electricity too small to be observed by any of them. To be able to collect these, it is necessary to have one capable of retaining the electricity it receives for a considerable time, and of allowing it to accumulate till it becomes capable of being measured by some of the common methods. Upon instruments of this kind Mr. Cavallo gives the following dissertation.

"Besides the way of ascertaining small quantities of electricity by means of very delicate electrometers, two methods have been communicated to the philosophical world, by which such quantities of electricity may be rendered manifest as could not be perceived by other means. The first of those methods is an invention of M. Volta, the apparatus for it being called the condenser of electricity, and is described in the Philosophical Transactions, Vol. LXXII. The second is a contrivance of the abovementioned Mr. Bennet, who calls the apparatus the doubler of electricity. A description of it is inserted in the Philosophical Transactions, Vol. LXXVII.

M. Volta's condenser consists of a flat and smooth metal plate, furnished with an insulating handle, and a semiconducting, or imperfectly insulating, plane. When one wishes to examine a weak electricity with this apparatus, as that of the air in calm and hot weather, which is not generally sensible to an electrometer, he must place the abovementioned plate upon the semiconducting plane, and a wire, or some other conducting substance, must be connected with the metal plate, and must be extended in the open air, so as to absorb its electricity; then, after a certain time, the metal plate must be separated from the semiconducting plane, and being presented to an electrometer, will electrify it much more than if it had not been placed upon the abovementioned plane."

"The principle on which the action of this apparatus depends is, that the metal plate, whilst standing contiguous to the semiconducting plane, will both absorb and retain a much greater quantity of electricity than it can either absorb or retain when separate, its capacity being increased in the former and diminished in the latter case."

"Whoever considers this apparatus, will easily find, that its office is not to manifest a small quantity of electricity, but to condense an expanded quantity of electricity into a small space: hence, if by means of this apparatus one expected to render more manifest than it generally is, when communicated immediately to an electrometer, the electricity of a small tournasol, or of a hair when rubbed, he would find himself mistaken."

"It is Mr. Benner's doubler that was intended to answer that end, viz. to multiply, by repeated doubling, a small, and other wise unperceivable, quantity of electricity, till it became sufficient to affect an electroscope, to give sparks, &c. The merit of this invention is certainly considerable; but the use of it is far from precise and certain."

"This apparatus consists of three brass plates, which we shall call $A$, $B$, and $C$, each of which is about three or four inches in diameter. The first plate $A$ is placed upon the gold-leaf electrometer, or it may be supported horizontally by any other insulating stand, and its upper part only is thinly varnished. The second plate $B$ is varnished on both sides, and is furnished with an insulating handle, which is fastened laterally to the edge of it. The third plate $C$ is varnished on the under side only, and is furnished with an insulating handle, which is perpendicular to its upper surface."

"This apparatus is used in the following manner. The plate $B$ being laid upon the plate $A$, the small quantity of electricity, which is required to be multiplied, is communicated to the upper part of the plate $A$, and at the same time the upper part of $B$ is touched with a finger; then the finger is first removed; the plate $B$ is afterwards removed from over the plate $A$. The plate $C$ is now laid upon $B$, and its upper surface is touched, for a short time, with a finger. By this operation it is clear, that if the electricity communicated to the plate $A$ is positive, the plate $B$ must have acquired a negative electricity, and the plate $C$ must have acquired the positive, viz. the fame of the plate $A$. Now the plate $B$, being separated from $C$, is laid as before upon $A$; the edge of $C$ is brought into contact with the under part of the plate $A$, and at the same time the upper part of $B$ is touched with a finger; by which means the plate $B$, being acted upon by the atmospheres of both the plates $A$ and $C$, will acquire nearly twice as much electricity as it did the first time, and of course will render the plate $C$, when that is laid upon it, proportionately more electrified than before: thus, by repeating this operation, the electricity may be increased to any required degree."

"The varnish on those surfaces of the plates which are to lie contiguous to each other, serves to prevent the metal of one touching the metal of the other; for in that case, instead of one plate causing a contrary electricity in the other, the electricity of the first would be gradually communicated to the others, and would be dissipated."

"As soon as I understood the principle of this contrivance, I hastened to construct such an apparatus, in order to try several experiments of a very delicate nature, especially on animal bodies and vegetables, which could not have been attempted before, for want of a method of ascertaining exceedingly small quantities of electricity, but after a great deal of trouble, and many experiments, I was at last forced to conclude, that the doubler of electricity is not an instrument to be depended upon, for this principal reason, viz. that it multiplies not only the electricity which is willingly communicated to it from the substance in question; but it multiplies also that electricity which in the course of the operation is almost unavoidably produced by accidental friction; or that quantity of electricity, however small it may be, which adheres to the plates in spite of every care and precaution."

"Having found, that with a doubler constructed in the above described manner, after doubling or multiplying..."
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Methods of doubling 20 or 20 times, it always became strongly electrified, though no electricity had been communicated to it before the operation, and though every endeavour of depriving it of any adhering electricity had been practised; I naturally attributed that electricity which appeared after repeatedly doubling, to some friction given to the varnish of the plates in the course of the operation. In order to avoid entirely this source of mistake, or at least of suspicion, I constructed three plates without the least varnish, and which, of course, could not touch each other, but were to stand only within about one-eighth of an inch of each other. To effect this, each plate stood vertical, and was supported by two glass sticks, which were covered with sealing-wax. These were inserted into a wooden pedestal 7½ inches long, 2½ broad, and 1½ inch thick, being kept fast by cement both to the pedestal and likewise to another piece of wood fastened to the back of the plate. The plate itself is of strong tin, and measures about eight inches in diameter. The stand projects very little before the plate; by which means, when two of those plates are placed upon a table facing each other, the wooden stands will prevent their coming into actual contact.

I need not describe the manner of doubling or of multiplying with those plates; the operation being essentially the same as when the plates are constructed according to Mr. Bennet's original plan, excepting that, instead of placing them one upon the other, mine are placed facing each other; and in performing the operation they are laid hold of by the wooden stand $AB$; so that no friction can take place either upon the glass legs or upon any varnish; for these plates have no need of being varnished. Sometimes, instead of touching the plates themselves with the finger, I have fixed a piece of thin wire to the back of the plate, and have then applied the finger to the extremity of the wire, suspecting that some friction and some electricity might possibly be produced when the finger was applied in full contact to the plate itself.

It is evident, that as the plates do not come so near to each other in this as they do in the other construction, the electricity of one of them cannot produce so great a quantity of the contrary electricity in the opposite plate: hence, in this construction, it will be necessary to continue the operation of doubling somewhat longer; but this disadvantage is more than repaid by the certainty of avoiding any friction.

Having constructed those plates, I thought that I might proceed to perform the intended experiments without any further obstruction: but in this I found myself quite mistaken: for on trying to multiply with those new plates, and when no electricity had been previously communicated to any of them, I found, that after doubling 10, 15, or at most 20 times, they became so full of electricity as to afford even sparks. All my endeavours to deprive them of electricity proved ineffectual. Neither expelling them, and especially the glass sticks, to the flame of burning paper, nor breathing upon them repeatedly, nor leaving them untouched for several days, and even for a whole month, during which time the plates remained on the ground by means of good conductors, nor any other precaution I could think of, was found capable of depriving them of every vestige of electricity; so that they might show none after doubling 10, 15, or at most 20 times.

The electricity produced by them was not always of the same sort; for sometimes it was negative for two or three days together; at other times it was positive for two or three days more; and often it changed in every operation. This made me suspect, that possibly the beginning of that electricity was derived from my body, and being communicated by the finger to the plate that was first touched, was afterwards multiplied. In order to clear this suspicion, I actually tried those plates at different times, viz. before and after having walked a great deal, before and after dinner, &c. noting very accurately the quality of electricity produced each time; but the effects seemed to be quite unconnected with the abovementioned concomitant circumstances; which independence was further confirmed by observing that the electricity produced by the plates was of a fluctuating nature, even when, instead of touching the plates with the finger, they had been touched with a wire, which was connected with the ground, and which I managed by means of an inflating handle.

At first, after a great variety of experiments, which it is unnecessary to describe, I became fully convinced, that those plates did always retain a small quantity of electricity, perhaps of that sort with which they had been last electrified, and of which it was almost impossible to deprive them. The various quality of the electricity produced was owing to this, viz. that as one of those plates was possessed of a small quantity of positive electricity, and another was possessed of the negative electricity, that plate which happened to be the most powerful, occasioned a contrary electricity in the other plate, and finally produced an accumulation of that particular form of electricity.

Those observations evidently show, that no precise result can be obtained from the use of those plates; and of course, that when constructed according to the original plan, they are still more equivocal, because they admit of more sources of mistake.

As those plates, after doubling or multiplying only four or five times, show no signs of electricity, none having been communicated to them before, I imagined that they might be useful for far only, viz. that when a small quantity of electricity is communicated to any of them in the course of some experiment, one might multiply it with safety four or five times, which would even be of advantage in various cases; but in this also my expectations were disappointed.

Having observed, after many experiments, that, ceras parsulis, when I began to multiply from a certain plate, which we shall call $A$, the electricity which resulted was generally positive; and when I began with another plate $B$, viz. considered this plate $B$ as the first plate, the resulting electricity was generally negative; I communicated some negative electricity to the plate $A$, with a view of destroying its inherent positive electricity. This plate $A$ being now electrified negatively, but so weakly as just to affect an electroscope, I began doubling; but after having doubled three or four times, I found, by the help of an electroscope, that communicated negative electricity in the plate was diminished instead of being increased; so that sometimes it vanished entirely, though by continuing the operation...
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Methods of ion often begin to increase again, after a certain period. This shows, that the quantity of electricity, which however small it may be, remains in a manner fastened to the plates, will help either to increase or to diminish the accumulation or multiplication of the communicated electricity, according as it happens to be of the same or of a different nature.

After all the abovementioned experiments made with those doubling or multiplying plates, we may come to the following conclusion, viz. that the invention is very ingenious, but their use is by no means to be depended upon. It is to be wished that they may be improved so as to obviate the weighty objections that have been mentioned; the first delideratum being to confirm a set of such plates as, when no electricity is communicated, they will produce none after having performed the operation of doubling for a certain number of times.

Upon the whole, the methods by which small quantities of electricity may be ascertained with precision are, as far as I know, only three. If the absolute quantity of electricity be small and pretty well condensed, as that produced by a small tournain when heated, or by a hair when rubbed, the only effectual method of manifesting its presence, and ascertaining its quality, is to communicate it immediately to a very delicate electrometer, viz. a very light one, that has no great extent of metallic or other conducting substance; because if the small quantity of electricity that is communicated to it be expanded throughout a proportionately great surface, its elacticity, and of course its power of separating the corpuscles of an electrometer, will be diminished in the same proportion.

The other case is, when one wants to ascertain the presence of a considerable quantity of electricity, which is dispersed or expanded into a great space, and is little condensed, like the condenst electricity of the atmosphere in clear weather, or like the electricity which remains in a large Leyden phial after the first or second discharge.

To effect this, I use an apparatus, which in principle is nothing more than M. volta's condenser; but with certain alterations, which render it less effectual than in the original plan, but at the same time render it less subject to equivocal refults. I place two of the above described tin-plates upon a table, facing each other, and about 4th of an inch apart. One of these plates, for instance A, is connected with the floor by means of a wire, and the other plate B is made to communicate, by any convenient means, with the electricity that is required to be collected.

In this disposition the plate B, upon account of the proximity of the other plate, will imbibe more electricity than if it stood far from it, the plate A in this case acting like the semiconducting plate of M. volta's condenser, though not with quite an equal effect, because the other plate B does not touch it; but yet, for the very same reason, this method is incomparably less subject to equivocal refults. When the plates have remained in the said situation for the time that may be judged necessary, the communication between the plate B and the conducting substance which conveyed the electricity, must be discontinued by means of a glass stick, or other insulating body; then the plate A is removed, and the plate B is presented to an electrometer, in order to ascertain the quality of the electricity; but if the electrometer be not affected by it, then the plate B is brought with its edge into contact with another very small plate, which stands upon a semiconducting plane, after the manner of M. volta's condenser (n), which done, the small plate, being held by its insulating handle, is removed from the inferior plane, and is presented to the electrometer: and it frequently happens, that the small plate will affect the electrometer very sensibly, and quite sufficient for the purpose: whereas the large plate itself showed no clear signs of electricity.

If it be asked, why I use the semiconducting plate for this small plate, and not for the large one? the answer is, first, because the large semiconducting plate is incomparably more difficult to be procured than the small one; and, secondly, because the small plate may be easily deprived of any accidental electricity which may adhere to it; but the large one is more difficulty rendered fit for the purpose, especially as the large plate ought in general to remain upon it a much longer time than the small plate is to remain upon its semiconducting plane.

The third and last case is, when the electricity to be ascertained is neither very considerable in quantity nor much condensed; such is the electricity of the hair of certain animals, or the surface of chocolate when cooling, &c. In this case the best method is to apply a metal plate, furnished with an insulating handle, like an electrophorus plate, to the electrified body, and to touch this plate with a finger for a short time whilst standing in that situation; which done, the plate is removed, and is brought near an electrometer; or its electricity may be communicated to the plate of a small condenser, as directed in the preceding cafe, which will render the electricity more conspicuous. It is evident, that in this case the metal plate will acquire the electricity contrary to that of the substance in question; but this answers the same purpose; for if the electricity of the plate be found to be positive, one must conclude, that the electricity of the body in question is negative, and contrarwise. In this operation, care must be had not to put the metal plate too near, or in full contact with the substance to be examined, lest the friction, likely to happen between the plate and the body, should produce some electricity, the origin of which might be attributed to other causes.

Having thus far decribed the four principal methods of ascertaining the presence and quality of electricity, when its quantity or degree of condensation is small, I shall now beg leave to add some farther remarks on the subject of electricity in general, and which have been principally suggested by what has been mentioned.

On the hypothesis of a single electric fluid, it is said, that every substance in nature, when not electrified

(n) This small plate is nearly of the size of a shilling, and the semiconducting plate is of wood covered with copal varnish.
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What portion of the electricity first communicated to the electrometer still remained in it. Let us make the measuring chord of the angle of divarication on first electrifying the electrometer, or rather when first observed, equal to 16; or let us conceive that quantity of electricity to be divisible into 16 equal parts.

I observed, that, when the chord of the angle became equal to eight, the time elapsed between this and the first observation was one minute; when the chord became equal to four, the time elapsed between this point and the preceding observation was 3° 30'; when the chord became equal to two, the time elapsed since the preceding observation was 1° 17'; and when the chord became equal to one, the time elapsed since the preceding observation was one hour and a quarter; after which the electrometer remained sensibly electrified for a long time.

In repeating this experiment, the times elapsed between the corresponding observations did not follow strictly the same proportion of increase; nor did they decrease exactly in the same proportion, of the preceding times, which may be attributed in great measure to the inaccuracy in observing, and to the fluctuating state of the air; but it could be safely inferred from all the experiments, that the times required for the dispersion of the electricity were at least greater than the inverse duplicate proportion of the densities of the electricity remaining in the electrometer. And if we imagine, that they continue to diminish in the same proportion of increasing time, which is far from being an extravagant supposition, we shall find, by a very easy calculation, that about two years after the electrometer would still retain the 1/16th part of the electricity communicated to it in the beginning of the experiment; and as we do not know how far a quantity of electricity is divisible, or to what extent it may be expanded, we may conclude with saying, that strictly speaking, the electrometer would remain electrified for many years.

It may be inferred from this, as well as from many other experiments, that the air, or in general any substance, is a more or less perfect conductor of electricity, according as the electricity which is conveyed through it is more or less condensed; so that if a given quantity of electric fluid be communicated to a small brass ball, one may take it away by simply touching the ball with a finger; but if the same quantity of electric fluid be communicated to a surface of about 100 or 1000 square feet, the touching with the finger will hardly take away any part of it.

If it is asked, what power communicates the electricity, or originally disturbs the equilibrium of the natural quantity of electric fluid in the various bodies of the universe? we may answer, that the fluctuating electric state of the air, the passage of electrified clouds, the evaporation and condensation of fluids, and the friction arising from divers causes, are perpetually affecting upon the electric fluid of all bodies, so as either to increase or diminish it, and that to a more considerable degree than is generally imagined.

I shall conclude, with briefly proposing an explanation of the production of electricity by friction, which is dependent upon the above stated proportion,

(a) This proposition was first ascertained by F. Beccaria. See Philosophical Transactions, Vol. LVI.
well insulated. \textit{CHILKM} and \textit{NGFP} are two frames of wood, which being fastened to the bottom-boards by means of brass hinges, may be placed so as to stand in an upright position and parallel to the tin-plate, as shown in fig. 94, or they may be opened, and laid upon the table which supports the instrument, as shown in fig. 93. The inward surfaces of those frames from their middle upwards are covered with gilt paper \textit{XY}; but it would be better to cover them with tin-plates hammered very flat. When the lateral frames stand straight up, they do not touch the tin-plate; but they stand at about one-fifth part of an inch asunder. They are also a little shorter than the tin-plate, in order that they might not touch the tin-tubes \textit{AD}, \textit{BC}. In the middle of the upper part of each lateral frame is a small flat piece of wood \textit{S} and \textit{T}, with a brass hook; the use of which is to hold up the frames without the danger of their falling down when not required, and at the same time it prevents their coming nearer to the tin-plate than the proper limit. It is evident that the instrument is to be placed as shown in fig. 94, the gilt surface of the paper \textit{XY}, which covers the inside of the lateral frames, stands contiguous and parallel to the tin-plate.

When the instrument is to be used, it must be placed upon a table, a window, or other convenient support; a bottle electrometer is placed near it, and is connected, by means of a wire, with one of the tin-tubes \textit{AD}, \textit{BC}; and by another conducting communication the tin-plate must be connected with the electrified substance, the electricity of which is required to be collected on the plate \textit{ABCD}; thus, for instance, if it be required to collect the electricity of the rain or of the air, the instrument being placed near a window, a long wire must be put with one extremity into the aperture \textit{A} or \textit{B} of one of the tin-tubes, and with the other extremity projecting out of the window. If it be required to collect the electricity produced by evaporation, a small tin pan, having a wire or foot of about six inches in length, must be put upon one of the tin-tubes, so that, the wire going into the tube, the pan may stand about two or three inches above the instrument. A lighted coal is then put into the pan, and a few drops of water poured upon it, which will produce the desired effect. Thus far may suffice with respect to the mechanical description of the instrument: the power and use of it will be made apparent by the following experiments.

1. Communicate to the tin-plate \textit{ABCD} a quantity of electricity, for instance, as much as would very sensibly affect a common cork-ball electrometer; then, if the lateral frames \textit{GHM}, \textit{NGP} stand upright as in fig. 94, the electrometer \textit{W} will show no divergence; but if the frames are opened and let down, as in fig. 93, the balls of the electrometer \textit{W} will immediately repel each other, and by the approach of an excited piece of sealing-wax, the quality of the electricity may be easily ascertained after the usual manner. Put up the lateral frames again, and the electricity will apparently vanish; let them down, and the electricity will re-appear, and so on. If you touch any part of the tin-plate or tin-tubes with your finger, the electricity is thereby entirely removed, and that will be the case whether the lateral frames are up or down.

2. Take...
Sect. X.

ELECTRICITY.

Methods of measuring yards square, and holding it by a silk thread, electrify it so weakly as not to be capable of affecting an electrometer; then bring it in contact with the tin-plate of the collector, whilst the lateral frames are up. This done, remove the tin-foil, let down the lateral frames one after the other; and on doing this the electrometer will immediately manifest a considerable degree of electricity. But if the electrometer were to show no sensible degree of electricity, a smaller collector, viz. one having a tin-plate of about four square inches, must be brought into contact with the tin-plate of the large collector, whilst the lateral frames of the latter only are down; and then the small collector being removed from the large one, its lateral frames are opened, and its tin-plate is presented to an electrometer, which will thereby be electrified to a much greater degree than the electrometer \( W \) was by the large collector.

3. Let a common cork-ball electrometer be fastened to an insulated conductor, having about two or three square feet of surface, and communicate to it such a quantity of electricity as may be sufficient to let the balls of the electrometer land at about one inch asunder. In this state bring the conductor in contact with the tin-plate of the collector for a very short time, and it will be found, that the balls of its electrometer will immediately approach and touch each other, showing that the electricity of the conductor is gone to the plate of the collector; and, in fact, if you let down the lateral frames, the balls of the electrometer \( W \) will immediately repel each other to a very great degree.

It seems, therefore, to be clearly shown by these experiments, that in order to emulsify the surface of an instrument can collect and retain a vast quantity of electricity, when the conducting surfaces of the lateral frames are contiguous to it, in comparison to that quantity which it can either collect or retain when those surfaces are removed from its vicinity.

The quantity of electricity which the tin-plate \( ABCD \) is capable of collecting, principally depends on three circumstances, viz. 1st, on the distance between the tin-plate and the conducting lateral surfaces; the smaller that distance is, the greater being the collecting power. 2dly, on the size of the instrument and, 3dly, on the quantity of electricity pollested by the body from which it must be collected or taken away.

The principle upon which the action of this instrument depends, is the same as that of the electrophorus of M. Volta's condenser, and of many other electrical experiments; namely, that a body has a much greater capacity for holding electricity when its surface is contiguous to a conductor which can easily acquire the contrary electricity, than when it flanks not in that situation.

The electrical air thermometer, fig. 34, is an instrument designed to show the power of electricity by its rarefaction of the air through which the fluid passes. But though this instrument in theory might be supposed capable of manifesting the very least degrees of electricity, the rarefaction of the air by its means is so very small, that unless the power of electricity be very considerable, no expansion will be perceived. The instrument, however, certainly has its uses, and many curious experiments may be performed with it. \( AB \) represents a glass cylinder having a brass cap, with a wire and knob pulling through \( \mu \), and which is cemented on the open part of the glass. The under part is inverted into a small dish \( BC \), containing quicksilver or some other liquid, which may rise in the small tube \( AH \) by any expansion of the air in the cylinder \( AB \). \( CD \) is an insulating fland, which serves to sustain the whole; \( E \) is an hook by which a communication may be made to the ground; and \( F \) another for connecting the whole with the prime conductor of an electrical machine. The discharge of electricity made by the sparks between the knobs \( G \) and \( I \) expand the air, and force up the fluid into the small tube \( AH \); and its rise there is marked upon a graduated scale. This instrument will likewise answer for showing the diminution or increase of any kind of air by the electric spark, as well as its sudden expansion by a spark or shock of a phial. Mr Morgan has shown that the mercury in a common thermometer, if well made, may be raised by the electric blast.

In a treatise lately published by the Reverend Mr Abraham Bennet, he gives an account of the machine called the "double of electricity," with some improvements upon it by Mr Nicholson; by which means the machine becomes less liable to the objections of Mr Cavallo abovementioned. In its improved state, it consists of two insulated and immovable plates about two inches in diameter, and a moveable plate also insulated, which revolves in a vertical plane parallel to the two immovable plates, passing them alternately.

"The plate \( A \) is constantly insulated, and receives the communicated electricity. The plate \( B \) revolves, and CLXXVI. when it is opposite the plate \( A \), the connecting wires at the end of the cross piece \( D \) must touch the pins of \( A \) and \( C \) at \( E \); and a wire proceeding from the plate \( B \) must touch the middle piece \( G \), which is supported by a brass, wooden, or other conducting pillar in connection with the earth. In this position, if electricity is communicated to the plate \( A \), the plate \( B \) will acquire a contrary state; and passing forwards, the wires also moving with it by means of the fame insulating axis, the plates are again insulated till the plate \( B \) is opposite to \( C \), and then the wire at \( H \) touches the pin in \( C \), connecting it with the earth, and communicating the contrary state of electricity to that of \( B \), but of the same kind with that of \( A \). By moving the handle still further, \( B \) is again brought opposite to \( A \); and the connecting wires joining \( A \) and \( C \), they both act upon \( B \), which is connected with the earth as before, and nearly double its intensity, whilst the electricity of \( C \) is absorbed into \( A \); because of the increased capacity of \( A \), whilst opposed to \( B \), capable by its connection with the earth of acquiring a contrary state sufficient to balance the influence atmospheres of both plates.

Thus by continuing to revolve the plate \( B \), the process is performed in a very expeditious and accurate manner.

"The ball \( I \) is made heavier on one side than the other, and referred upon the axis opposite to the handle, to counterbalance the plate \( B \), which may therefore be stopped in any part of its revolution."

Yet notwithstanding the convenience and accuracy of the doubler, it always produced spontaneous electricity,
Electricity.  

Methods of measuring Electricity, &c.

Method of city, even after all the refrusive substances used in its construction had been melted over a candle, and after standing a long time with its plates in connection with the earth. I therefore conjectured that this spontaneous electricity was not owing to accidental friction, but to the increased capacity of approximating parallel plates which might attract and retain their charge tho’ neither of them were insulated. To prove my hypothesis, I first endeavoured more effectually and speedy to deprive the instrument of the electricity left communicating, and that I might know whether this spontaneous charge, supposed to arise from the increased capacity of the parallel plates, would be always of the same kind.

To effect this deprivation, I connected the plates \(A\) and \(C\) together by a wire hooked at each end upon two small knobs on the backs of the plates, the middle of the same wire touching the pillar which supports the doubler. Another wire was hooked at one end upon the back of the plate \(B\), and at the other end to the brass ball which counterbalances this plate. Thus all the plates were connected with the earth; and by turning the handle of the doubler, it might be discharged of electricity in every part of its revolution.

After often trying this method of depriving the doubler, I observed that its spontaneous charge was almost always negative. I then touched \(A\) and \(C\) with a positively charged bottle, and turned the doubler till it produced sparks for a long time together; and after this strong positive charge, I hooked on the wires above, and revolved the plate \(B\) about 100 times, which so deprived the doubler of its positive electricity, that when the wires were taken off, it produced a negative charge at about the same number of revolutions which it required before.

The positively charged bottle was again applied, and the wires being hooked upon the plates as before, \(B\) was revolved only 50 times; yet this was found sufficient to deprive it of its positive charge, and in many experiments 5 or 6 revolutions were sufficient: but I never thought it safe to stop at so few, and have therefore generally turned the handle 40 or 50 times between every experiment.

Left electricity adhering to the electrometer should obstruct the above experiments. I did not let it stand in contact with the doubler during its revolutions, but touched the plate \(A\) with the cap of the electrometer, after I supposed its electricity was become sufficiently sensible: but left even this contact should communicate any electricity, I made a cap for my electrometer of shell-lac, having a small tis tube in the centre, to which the gold-leaf was suspended within the glass, and a bent wire was fixed to the top, which might easily be joined to the plate \(A\) of the doubler, and thus the gold leaf was more perfectly insulated, and the electricity could not be diffused over so large a surface. The glass which insulates the plates and crow piece of the doubler was also covered with shell-lac.

Nicholson’s instrument for distinguishing the two electricities.

Fig. 66. shows an instrument invented by Mr. Nicholson for distinguishing the two electricities from one another. \(A\) and \(B\) are two metallic balls placed at a greater or lesser distance from each other by means of the joint at \(C\); the two branches \(C\) of being made of varnished glass. From one of the balls \(B\) proceeds a short point towards the other ball \(A\). If the two be placed in the course or current of the electric matter, so that it may pass through the air from one to the other, its direction will be known. For if the electric matter passes from \(A\) to \(B\), there will be a certain distance of the balls dependent on the strength of electricity, within which the dense sparks will pass from the point; but if its course be in the contrary direction, no spark will be seen, unless the balls be almost in contact with the point.

We shall conclude this section with some observations on the electrical kite; which perhaps may after all be found the only instrument that will certainly show the electricity of the atmosphere upon all occasions. The use of it, however, is very troublesome, as it obliges the observer always to go abroad, which sometimes must be disagreeable. By means of the apparatus represented fig. 72, this inconvenience may be avoided. \(AB\) represents the firing of the kite, infufed by means of the silk cord \(C\), tied about the foot of a table in the room where the experiments are to be made. This firing passes out through a window in the room, and supports the kite; the electricity being conveyed by means of a small wire to the insulated conductor \(D\), having a quadrant electrometer applied to it, as in the figure. \(C\) is a glass tube about 18 inches long, with a brass wire and knob proceeding from it, by taking a small spark with which from the conductor, the quality of the electricity may be observed.

Plate CLXXVI. represents a pocket electrometer, which A convenient may be very conveniently used when the atmospheric electricity is collected in any quantity. The case or handle of this electrometer is formed by a glass tube about three inches long and 4ths of an inch in diameter, half of which is covered with sealing-wax. From one extremity of this tube, viz. that without sealing-wax, a small loop of silk proceeds, which serves occasionally to hang the electrometer, on a pin, &c. To the other extremity of the tube a cork is adapted, which, being cut tapering on both ends, can fit the mouth of the tube with either end. From one extremity of this cork two linen threads proceed, a little shorter than the length of the tube suspending each a little cone of pith of elder. When this electrometer is to be used, that end of the cork which is opposite to the threads is pushed into the mouth of the tube; then the tube forms the insulated handle of the pinch electrometer, as represented fig. 69. But when the electrometer is to be carried in the pocket, then the threads are put into the tube, and the cork stops it as represented fig. 68. The peculiar advantages of this electrometer are, its convenient small size, its great sensibility, and its continuing longer in good order than any other. Fig. 68. represents a case to carry the above described electrometer in. This case is like a common tooth-pace-case, except that it hath a piece of amber fixed on one extremity \(A\), which may occasionally serve to electrify the electrometer negatively; and on the other extremity it hath a piece of ivory fastened upon a piece of amber \(B\) \(C\). This amber \(B\) serves only to insulate the ivory, which when insulated, and rubbed against woollen cloths, acquires a positive electricity, and is therefore useful to electrify the electrometer positively.

In making experiments with the kite, it is sometimes necessary to act with caution, on account of the
Methods of the great quantity of electricity collected by it. Of this measuring we have already given some instances, to which we shall add the following from Mr. Bennett; viz. that having on the 5th of July, 1788, raised a kite with 200 yards of string, when it had been flying about an hour, a dark cloud appeared at a great distance, and changed the electricity from positive to negative. The electric power increased till the cloud became nearly vertical, when some large drops of rain fell, and our author attempting to secure the string from wet, received such a strong shock in his arm, as deprived it for a few seconds of sensation. The explosion was heard at the distance of about 40 yards, like the loud crack of a whip.

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It is very considerable timesince electricians began to make experiments on this subject; and it was generally agreed that the electric fluid was favourable to the growth of vegetables. For a long time, however, such researches seem to have been laid aside; nor indeed did it seem very probable that any quantity of the fluid could be collected artificially sufficient to be of use. But in a late treatise the subject has been revived by the Abbé Berthelon; who not only shows a method of collecting the fluid from the atmosphere so as to be useful in ordinary practice, but endeavours to cure by means of this fluid some of those difficulties to which plants are liable from insects, and which cannot be removed by any of the ordinary remedies.

"In the first place (sayes the Abbé) there is continually and everywhere different in the atmosphere (particularly in the upper regions) a considerable quantity of the electric fluid. On the mountains especially, it is always felt with moist energy, and shows itself in greater abundance than on the plains. On the former, if you erect conductors, or lanch electric paper-kites, in order to seek out and direct this fluid towards the surface of the earth, where several causes sometimes prevent its appearance; you will find it very soon subjected to your power, directed, as if by your command, from heaven itself, and creep at your feet to execute your orders. These are facts extremely well ascertained; but if one doubts of them, he has nothing to do but to erect a similar apparatus or set off electric kites to be convinced of the truth. These will immediately and at all times obtain an electricity so much the more strong as the height of the apparatus shall be the more considerable. Being informed, that in England this experiment was tried with the most convincing effect, I mention it as it has hitherto not been published. Upon a high mountain there were launched two-electric paper-kites, one of which was fixed to the interior extremity of the other, thus gaining a double advantage in point of height: the consequence of which was, that the electric effects were incomparably greater than those produced by a single instrument. But I suppose it entirely useless to insist longer upon a fact so well demonstrated and universally admitted."

"This principle being granted: in order to remedy the deficiency of electric fluid which has already been proved to be hurtful to vegetation, we must erect in the spot which we want to revitalize the following new apparatus, which has had all possible succcess, and which I shall call by the name of the electro-vegetometer. This machine is as simple in its construction as effectual in its manner of acting; and I doubt not but it will be adopted by all those who are sufficiently instructed in the great principles of nature."

"This apparatus is composed of a mast A B (Plate CLXXX. fig. 82.), along pole thrust just so far into the earth as to stand firm and be able to resist the winds. That part of the mast which is to be in the earth must be well dried at the fire; and you must take care to lay on it a good coat of pitch and tar after taking it from the fire, that the reinious particles may enter more deeply into the pores of the wood, which will then be dried at the same time that its humidity will be expelled by the heat. Care must likewise be taken to throw around that part fixed in the earth a certain quantity of coal-dust, or rather a thicker layer of good cement, and to build besides a bafe of maffenwork of a thicknes and depth proportionable to the elevation of the instrument, so as to keep it durable and solid. As to the portion of it above the ground, it will be sufficient to put upon it some coats of oilpaint, except one chooses rather to lay on a coat of bitumen the whole length of the piece.

"At the top of the mast there is to be put an iron-conicale or support C; whole pointed extremity you are to fix in the upper end of the mast, while the other extremity is to terminate in a ring, in order to receive the hollow glass tube which is seen at D, and in which there is to be glued an iron rod of the point E. This rod, thus pointed at its upper extremity, is completely insulated, by reason of its keeping a strong hold of a thick glass tube, which is filled with a quantity of bluminous matter, mixed with charcoal, brick-dust, and glass-powder; all together forming a sufficiently good and strong cement for the object in view.

"To prevent rain wetting the glass tube, care must be taken to folder to the rod E a funnel of white-iron; which consequentlv is entirely insulated. From the lower extremity of the rod F hangs a chain O, which enters into a second glass tube H, supported by the prop L. The lower end of the above mentioned chain rests upon a circular piece of iron wire, which forms the terminus of the horizontal conductor KL MN. In L is a breaker with a turning joint or hinge, in order to move to the right or left the iron rod L MN; there is likewise another in Q, to give still greater effect to the circular movement. O and P are two supports terminating in a fork, where there is fixed a silken cord tightly stretched, in order to inflate the horizontal conductor in N are several very sharp iron-paints.

"In fig. 82, you see an apparatus in the main like this form of the construction, but with some difference in the which at the upper extremity of the mast A B there is bored an instrument, a hole into which enters a wooden cylinder c, which has been carefully dried before a great fire, in order to extract its humidity, dilate its pores, and saturate it with tar, pitch, or turpentine; applied at repeated intervals. The more the heat the wood and bituminous matter receives, the more the substance penetrates, and the inflation will be the more complete. It is moreover proper to bemear the circumference of the little cylinder with a pretty thick coat of bitumen. This preparation being made, we next infuse the cylinder c into
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"At the upper extremity of the cylinder C we strongly attach an iron-rod g, which, instead of one, is terminated by several sharp points all of gilded iron. In e you see a branch of iron resembling the arm of an iron-crow, from whence hangs an iron chain b, at the end of which there is a crooked piece of iron resembling a mason's square, and ending in a fork. The piece of iron f is a ring with a handle entering a little into the glass tube m filled with magnesia, in the same manner as does the iron rod n. The conductor p e is to be considered as an additional piece to act in that marked p. There are likewise put iron spikes in q; the support r resembles those of O and P in the former figure. In this new machine you can lengthen or shorten the horizontal conductor as you please; and as the iron-ring turns freely in a circular garge made in the mast, the conductor is enabled to describe the entire area of a circle.

"The construction of this electro-vegetometer once well understood, it will be easy for us to conceive its effects. The electricity which prevails in the aerial regions will soon be drawn down by the elevated points of the upper extremity. This effect of the points is proved by the most decisive experiments, and is called by philosophers the power of points.

"The electric matter brought down by the point E, or by those marked f f f f, will be necessarily transmitted both by the rod and chain; because the inflammation produced at the upper extremity of the mast completely prevents its communication with the timber. The electric fluid passes from the chain to the horizontal conductor K M or n o; it then escapes by the points at P and q; because the same points that have the power of bringing down the electric fluid, have likewise that of pulling it forward; a thing well known by experience.

"The manner of using this instrument is not more difficult than the knowledge either of its conductor or effects. Suppose, for example, we are to place it in the midst of a kitchen-garden. By making the horizontal conductors turn round successively, you will be able to carry the electricity over the whole surface of the proposed ground. The electric fluid thus drawn down, will extend itself over all the plants you want to cultivate; and this at a time when there is little or no electricity in the lower regions nigh the surface of the earth.

"On the other hand, when it happens that the electric fluid shall be in too great abundance in the atmosphere, in order to take off the effect of the apparatus in K fig. 82. and in n fig. 83. you have only to hang to it an iron-chain reaching to the ground, or else a perpendicular iron-rod, which will have the same effect, viz. that of destroying the inflammation, and of insensibly transmitting the electric fluid in the same proportion as it is drawn by the points; so that there shall never be an overcharge of this fluid in the instrument, and its effect shall be either something or nothing, according as you add or remove the second chain or the additional rod.

"There will be nothing to fear from the spontaneous discharge of this apparatus, because it is terminated below by proper points in P and q of both machines; effects of it and it is a certain fact, that a pointed conductor makes Electricity no explosion, and that instead of flashes there are only Vegetal luminous streams. However, it will be easy to furnish one, by means of which we may approach the apparatus with perfect security; it is only necessary to hold the hand before it. This has the form of a great C, and is of a height equal to the distance that takes place between the horizontal conductor and the surface of the earth. This discharger near the middle must be furnished with a glass-handle; and at the extremity which is directed towards the conductor, there must hang an iron-chain made to trail on the ground. This instrument is an excellent safeguard. See fig. 84.

"By means of the electro-vegetometer just now described, one may be able to accumulate at pleasure this wonderful fluid, however diffused in the regions above, and conduct it to the surface of the earth, in those seasons when it is either scantily supplied, or its quantity is insufficient for vegetation; or although it may be in some degree sufficient, yet can never produce the effects of a multiplied and highly increased vegetation. So that by these means we shall have an excellent vegetable manure or nourishment brought down as it were from heaven, and that too at an easy expense; for after the construction of this instrument, it will cost you nothing to maintain it: It will be moreover the most efficacious you can employ, no other substance being so active, penetrating, or conducive to the germination, growth, multiplication, or reproduction of vegetables. This heavenly manure is that which nature employs over the whole habitable earth; not excepting even those regions which are esteemed barren, but which, however, are often fecundated by those agents which nature knows so well to employ to the most useful purposes. Perhaps there was nothing wanting to bring to a completion the useful discoveries that have been made in electricity, but to show this so advantageous an art of employing electricity as a manure; consequently, that all the effects which we have already mentioned do depend upon electricity alone; and lastly, that all these effects, viz. acceleration in the germination, the growth, and production of leaves, flowers, fruit, and their multiplication, &c. will be produced, even at a time when secondary causes are against it; and all this is brought about by the electric fluid, which we have the art of accumulating over certain portions of the earth where we want to raise those plants that are most calculated for our use. By multiplying these instruments, which are provided at no expence (since iron-rods of the thickness of one's finger, and even less, are sufficient for the purpose), we multiply their beneficial effects, and extend their use ad infinitum.

"This apparatus having been raised with care in the midst of a garden, the happiest effects were perceived, viz. different plants, herbs, and fruits, in greater for vegetation wards as usual, more multiplied, and of better and vigerous quality. At the same time, it was observable, that, near during the night, the points P and q, as well as the thunder-upper extremities, were often garnished with beautiful luminous sparks. These facts are analogous to an observation which I have often made, viz. that plants grow best and are most vigorous near thunder-rods, where their situation favours their development. This is the
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The electricity of the air may be thus determined by a large electroscope.

How to augment the powers of vegetation by artificial electricity.

If one wants to water either a parterre or common garden beds and platforms of flowers, or any other plots in which are sown grain or plants of different ages and kinds, no method is more easy and expeditious than the following: Upon a small carriage with two wheels there is placed a framed inflator in form of a cake of pitch and rosin, as we have mentioned before in fig. 82. The carriage is drawn the whole length of the garden by a man or horse fixed to it. In proportion as you draw the carriage, the metallic cord winds itself upon a bobbin, which turns as usual. This last is inflated, either because the little apparatus that suttains the bobbin is planted in a mafs of rosin (when you choose the axle to be of iron), or else because this

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likewise serve to explain why vegetation is so vigorous in lofty forests, and where the trees raise their heads far from the surface of the earth, so that they seek, as it were, the electric fluid at a far greater height than plants laid elevated: while the sharp extremities of their leaves, boughs, and branches, serve as so many points granted them by the manifold hand of nature, to draw down from the atmosphere that electric fluid, which is so powerful an agent in forwarding vegetation, and in promoting the different functions of plants.

"This electro-vegetometer may be set up not only in a kitchen-garden, but in an orchard, in a field of corn, olive-yard, &c. &c. Everywhere the same effects are produced, namely, secundity in the foil, quickness of vegetation, increase of produce, superiority in the quality, &c. This machine is applicable to all kinds of vegetable productions, to all places, and all seasons: and if I am to believe the most enlightened and intelligent of my friends, the electro-vegetometer is one of the most noble and useful discoveries that have been made in the present century.

"Besides the advantages of the electro-vegetometer, of which we have been speaking above, there is still another very important one, namely, that by applying it to a large electroscope or grand conductor, fig. 85, we may thus find out the electricity of the atmosphere. For this purpose we must take away the points H R (fig. 82. and r. fig. 83.) which are feen in K R. This machine will likewise serve the purpose of a thunder-rod, if one takes care to thrust into the earth, to the depth of about ro or 15 feet, a leaden tube, whose upper extremity may rife a few inches above the surface of the ground; and into this tube you are to pass the long iron chain or perpendicular rod let apart for destroying the insolation, and whose upper end is to be hooked to a chain in H, fig. 82. or in k, fig. 83. These two chains are very strong, and are fit for serving as an excellent conductor. Or if you choose, you may substitute in their room wefts of white thread, or iron-wires, which will make no difference in the effects of the apparatus. In the figures we have preferred chains, that the distinction of the different parts may be the more sensibly perceived. With these additions the electro-vegetometer will be as good a thunder-rod as any that are ordinarily contructed.

"It is not only by means of the electricity in the atmosphere, collected by the above apparatus, that one can supply the electric fluid, which is so necessary to vegetation; but the electricity named artificial answers the fame purpofe. However anonilhing the idea may be, or however impossible it may appear to realize it, yet nothing will be found more easy upon trial. Let us suppose that one wants to augment the vegetation of trees in a garden, orchard, &c. without having recourse to the apparatus defined to pump down as it were the electricity from the atmosphere, it is sufficient to have a large inflating flool. This may be made in two ways: either by pouring a sufficient quantity of pitch and melted wax upon the above flool, whose borders being more raised than its middle, will form a kind of frame; or more simply, the flool (which is likewise called the inflator) shall only be composed of a plate longer than broad, supported by four glass-pillars, like those used for electrical machines. One must take care to place above the inflator a wooden tray full of water, and to cause mount upon the flool a man carrying a small pump in the form of a syringe. If you establish a communication between the man and an electrical machine put in motion (which is easily done by means of a chain that connects with the conductor of the machine), then the man thus inflatated (as well as every thing upon the flool) will be able, by pushing forward the sucker, to water the trees, by pouring upon them an electrical shower; and thus diffusing over all the vegetables under its influence a principle of secundity that exerts itself in an extraordinary manner upon the whole vegetable economy: and this method has moreover this advantage, that at all times and in all places it may be practiced and applied to all plants whatever.

"Every one knows that the electricity is communicated to the water thus employed; and it would be easy to obtain this most ample conviction (if any one doubted it), by receiving upon his face or hand this electrical shower; he immediately feels small punctures or strokes, which are the effects of the sparks that issue from each drop of water. This is perceived most sensibly if there is preferred a metal-dish to this electrical dew; for at the very instant of contact, brilliant flashes are produced.

"That the electricity received by the man from the chain may be communicated to the tray, we must put a small cake of white-iron, upon the end of which he may place his foot. The tray filled with water is a kind of magazine or reservoir to serve as a continual supply to the pump: After watering one tree, you transport the flool to a second, a third, and so on successively; which is done in a short time, and requires very little trouble.

"Instead of the chain, it is better to employ a cord or twiff of pinchebeck or any other metal; by means of which there can be no loss of the electric matter, as there is in the cafe of the chain by the ring-points. Moreover, this metal cord or thread being capable of being unwifht and lengthened, there will be no occasion of transporting it often the electrical machine. It is almost needless to add, that this string or metallic cord, which is always inflatated, may rest upon the fame kind of supports with those which have been exhibited in O P and s. of fig. 82. and 83. This method is simple, efficacious, and nowise expensive, and cannot be too much employed.

"If one wants to water either a parterre or common garden beds and platforms of flowers, or any other plots in which a kind of magazine or reservoir to serve as a continual supply to the pump.
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This movable axis is a tube of solid glass. There must also be a support, which serves to prevent the gold-thread or the metallic-cord from trailing on the ground, and thus dissipating the electricity; and, moreover, it serves as an insulator. To accomplish this last purpose, it is necessary that the ring into which it passes be of glass. One may likewise employ the insulators and supports marked G and F, in fig. 82 and 83. If a gardener, mounted upon an insulator, holds in one hand a pump full of water, and with the other takes hold of a metallic-cord, in order to transmit the electricity which comes from the conductor; in this case, the water being electrified, you will have an electrical shower; which falling on the whole surface of the plants which you want to electrify, will render the vegetation more vigorous and more abundant. A second gardener is to give additional pumps full of water to him who is upon the insulator, when he shall have emptied those he holds; and thus in a little time you will be able to electrify the whole garden. This method takes hardly longer time than the ordinary one; and although it should be a little longer, the great advantages resulting from it will abundantly compensate the small additional trouble.

By repeating this operation several days successively, either upon fixed foun or plants in a state of growth, you will very soon reap the greatest advantages from it. This operation, equally easy with the preceding described upon the subject of watering trees, has been put in practice with the greatest success. Several other methods, anwering the same purpose, might be devised; but they are all of them pretty similar to that just described.

I cannot finish this article without mentioning another method relative to the present object, although it be much less efficacious than the preceding ones. It consists in communicating to water kept in basins, reservoirs, &c. (for the purpose of watering), the electric fluid, by means of a good electrical machine. To this end, one must platter over with a bituminous cement all the interior surface of the basin defined to receive the water that serves for irrigation; the nature of this cement anwering the purpose of insulating, will prevent the electric fluid that communicates with the water from being dissipat ed; and the water thus charged with electricity will be the more fitted for vegetation.

The method just now laid down of electrifying water for the purpose of watering trees is both easy and cheap; the expense of the cement being inconsiderable, as it requires but once to be done, and as it prevents the water from filtrating and being lost, as well as from hurting the walls themselves, which would otherwise have occasion to be oftener repaired; consequently you are sufficiently indemnified by its utility for all the trouble you take. A machine applied to the extremity of the axe of the electric apparatus might communicate to it a rotary movement, and still further diminish the expense of the operation.

If the deficiency of the electric fluid, or rather a small quantity of it, is apt to be harsful to vegetables, too great abundance of this matter will likewise sometimes produce pernicious effects. The experiments made by Meffrs. Nairne, Banks, and other learned men of the Royal Society of London, prove sufficiently this truth. An electric battery, very strong, was discharged upon a branch of balsam still holding by its trunk. Some minutes after, there was observed a remarkable alteration in the branch, of which the balsam parts immediately withered, dropped towards the ground, died next day, and in a short time entirely dried up; at the same time that another branch of the same plant that had not been put under the electric chain, was not in the smallest degree affected.

This experiment repeated upon other plants showed the same effects; and it was remarked that the attraction, occasioned by a strong discharge of the electricity, produced an alteration different according to the different nature of the plants. Those which are balsam, more herbaceous, more aqueous, experienced in proportion impressions that are stronger and much more speedy in their operation.

A branch of each of the following plants, composing an electrical chain, it was observed by the able philosophers, that the balsam was affected by the discharge of the battery in a few moments after, and perished next day. The leaves of a marvel of Peru did not drop till the day following that; and the same phenomenon happened to a geranium. Several days elapsed before there was observed any fatal effect on the cardinal flower. The branch of a laurel did not show any symptoms till after the lapse of about 15 days, after which it died; but it was a full month before they perceived any sensible change on the myrtle; at the same time they constantly observed that the bodies of those plants and branches which had formed no part of the chain, continued to be fresh, vigorous, and covered with leaves in good condition.

It hardly ever happens that the superabundance of the electric fluid existing in a small portion of the atmosphere where a plant is situated, can be of so great a size that which took place by the explosion of the strong battery of Mr Nairne, directed particularly upon one branch; or if this should happen, it can only be upon a few individuals in very small number; as when lightning falls upon a tree, breaks it, strips it of its barks, or withers its leaves; or in the case of blashing or supposing to be lighting. This sentiment (says M. du Hamel) has acquired much probability from the discovery of the great effects of that electricity which is diffused so abundantly in the atmosphere when the weather is diffused to be stormy. (Elements d'Agric. Tom. I. p. 346.)

It is not proposed here to prescribe the means of remedying the pernicious effects which may be produced upon this occasion; as there are none of them in circumstances exactly similar to that of the experiments of the philosopher just now quoted. But although this enormous excess of the electric fluid which we have been speaking, never takes place through any great extent of space, nevertheless this excess, though even but inconsiderable, may be too great in several respects regarding the vegetable economy; and it is in this case that it is proper to seek the means of remedying it.

Let us suppose that one has some plants or shrubs,
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The Leyden phial, by the mere force of its shock, which can be augmented gradually, is capable of destroy- ing not only rabbits and pigeons, but bulls and oxen, especially when we employ electrical batteries of great size, and containing a great number of electrified jars. Of consequence then it may be employed even with little apparatus to kill a tender and delicate caterpillar, which, in order to shelter itself from the impregnations of the air, is obliged to keep perpetually shut up in the heart of trees, or in that of twigs, branches, or trunks themselves.

In order to succeed in killing these animals at the time when they begin to show their ravages, which mark likewise the place where the caterpillar is concealed, it is sufficient to make an electric chain with two plain iron-wires, and to place between the two that part of the tree where it is supposed the insect resides. One need not be afraid of taking in even a larger space, for the experiment will succeed as well in a great extent as in a small; and besides, one runs no risk of missing the enemy he wants to combat. Let us suppose, that one be averted from the forementioned symptoms, that there is an insect in the tree; in this case you place iron-wires above and below the place where you suspect it to be lodged. Next, you must take care to make the one communicate with the exterior surface of an ordinary jar charged with electricity, and the other with the interior surface, which it is easy to do by bending these iron-wires so as to make them approach the electrical jar; then upon discharging this veil where the electric fluid superabounds, the explosion is made to traverse the part where the animal lodges: the violence of the shock makes him die without recovery, and so destroys the evil in its source. If the ravage has not been carried to a high pitch, the tree recovers very soon, as I have often observed; but whatever be the result as to the re-establishment in certain circumstances, the evil proceeds no further; its progress stops; and it is always a great advantage to have arrested it in its march.

Several experiments have convinced me of the success of this method. Upon cutting off several branches on which I discharged my jar or Leyden bottle, I constantly observed the animal dead; and you never fail of killing it when the distance between the two extremities of the iron-wires is not too great, and when you take care to approach or remove them successively by repeating the shock several times.

The bottle here employed cannot hurt the vegetable economy, because its dimensions are not too great, and no batteries are brought in play. The electric shock, given in certain bounds, is useful to animals; it therefore cannot be noxious to plants in the same circumstances.

This operation is not tedious even when employed how to upon a great number of trees; but if one wants still further to abridge it, I here give him a method by which the experiment can be made in the same instant upon all the trees of an orchard, and will not be more tedious than if it were employed upon one tree only. You have only to provide a sufficient number of iron-wires, and to dispose them as was done for the first tree we spoke of just now, and in the same manner; by which means all these trees form an electric shock.
E L E C T R I C I T Y.

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255 How to destroy a caterpillar in the root of a tree.

256 To prevent the animals from generating in plants.

257 Advantages to be expected from this method.

258 "The method just mentioned is the most effectual that can be imagined, since it pursues the enemy, to his most concealed corners in the innermost texture of the wood, and is capable of killing him in the very heart of the tree, under the bark when he is to be found there, in the branches, and in the heart of the roots themselves: all which we have made appear in the foregoing remarks. I may further add, that there is no other remedy known but by electricity; for is it possible to find out under the bark of a tree one or more insects that gnaw and destroy it? Must we not in this case flirip them entire of their bark? and would not, therefore, the remedy be often worse than the disease? Besides, by what means could we penetrate into the heart of the tree? Would not the instrument employed to cut and lop it, rather add to the mischief, especially in the beginning of its progress? How again could we rummage to the inside of the roots? The tree thus uncovered, would it not suffer, especially in the great heats, when a perpiration more abundant must render necessary a nourishment, whose quantity ought at all times to be equal at least to the waste? Thus the celebrated Linnaeus struck with the calamities which fruit-trees in particular suffer from insects and their effects, of caterpillars, cried out: "Who shall deliver us from this danger?" Quis posset liberare arbores fructiferas de Animalibus?"

On this subject we cannot help observing, that there is some reason to suppose that the Abbe has over-rated the power of his remedy with regard to the destruction of insects. There is not the least doubt that an insect will be destroyed by sending a shock of electricity through its body; but while this insect is defended by the vegetable which it has pierced, and in which it lodges, the vegetable will also receive a very considerable part; and thus the insect may still escape, unless the shock be augmented to such a degree as to injure the vegetable also. His other experiments, it is said, have been confirmed by the observations of modern electricians.

Sect. XII. Effects of Electricity on Animals; of the Gymnus, Torpedo, and other Electric Fishes; Medical Electricity.

Soon after the discovery of the electrical shock, and the method of augmenting the power of electricity, it naturally became an object with philosophers to investigate the effects of it upon animal bodies. These were quickly found to be entirely similar to such as are produced upon any other conducting substances, viz. an emission of sparks, attraction and repulsion, &c. By degrees it was found, that very strong signs of electricity were exhibited by some animals, even without the application of any artificial apparatus. The experiment of producing sparks by stroking the back of a cat in frothy weather, readily showed that the electric fluid may exist in a very active state in the body of animal without injuring any of its functions. From animals of the inferior kind a transition was made to the human species; and signs of electricity were discovered in them where it had not been suspected before. Some people have been remarkable for an extreme lustre of their eyes: and others have been so much electrified naturally, as to give evident signs of it when a sensible electrometer had been applied to them. Others have manifested an extreme sensibility of even the smallest degrees of electricity, in so much that they would be affected by a flash of lightning, though so remote that the thunder could not be heard. All this showed that the subtile fluid we treat of bears a very active part in the animal economy, and led to more important researches on the subject. One of the first discoveries was, that some creatures are so strongly electrified naturally as to have it in their power to give a strong shock at pleasure, capable of destroying any small animal that comes near them. Of these, however, only three, and those of the aquatic kind, have yet been observed, viz. the gymnus electricus, the torpedo, and another called the filurus electricus.

The gymnus* hath the astonishing property of giving the electric shock to any person or number of persons, either by the immediate touch with the hand, or by the mediation of any metallic conductor; and a person who kept some of them told Dr. Garden, that they had this property much stronger when first caught than afterwards. See the gymnus electricus.
Some very large ones found in Surinam river.

The surpising property of the torpedo * in giving a violent shock to the person who takes it in his hands, or pedo, who treads upon it, was long an object of wonder. * For its natural history it is entirely fabulous; but at last the matter of fact being ascertained beyond a doubt, philosophers endeavored to find out the cause. M. Reaumur resolved it into the action of a vast number of minute muscles, which by their accumulated force gave a sudden and violent stroke to the person who touched it. But solutions of this kind were quite unsatisfactory, because the stroke was found to be communicated through water, iron, wood, &c. When the phenomena of electricity began to be better known, it was then suspected that the shock of the torpedo was occasioned by a certain action of the electric fluid; but as not the least spark of fire, or noize, could ever be perceived, this too seemed insufficient. Of late, however, Mr Walch has with indefatigable pains, not only explained this surpising phenomenon on the known principles of electricity, but given a demonstration of his being in the right, by constructing an artificial torpedo, by which a shock resembling that of the natural one, can be given.

The electric organs of the torpedo consist of two sets of very small cylinders lying under the skin, one of which is electrified positively and the other negatively.
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Effects on Animals.

Why no spark is discharged in the fish given by the torpedo.

Of the filurus electricus.

The colour of the body is greyish, and towards the tail it has blackish spots. The electric organ seems to be towards the tail, where the skin is thicker than on the rest of the body; and a whitish fibrous substance, which is probably the electric organ, has been distinguished under it. It is said that the filurus electricus has the property of giving a shock or numbing sensation like the torpedo, and that this shock is communicated through substances that are conductors of electricity; but no other particular about it is known with any considerable degree of certainty.

An inquisitive mind will immediately ask, for what purpose has nature furnished those animals with so singular a property? But the present knowledge of the subject seems to furnish no other answer, except that they are endowed with the power of giving the shock for the sake of securing their prey, by which they must subsist, and perhaps of repelling larger animals which might otherwise annoy them.

The ancients considered the shocks given by the torpedo as capable of curing various disorders; and a modern philosopher will hardly hesitate to believe their assertions, after that electricity has been found to be a remedy for many diseases.

Besides these animals which manifest their electric power evidently by giving a strong shock, there are the animals in which the fluid seems to act by the emission of light. This indeed has not been proved by actual experiment, tho' it would certainly be well worth while to try whether by infusing a number of them, any more evident signs of electricity could be obtained. These creatures are of the insect tribe; some of them furnished with wings, as the lightning flies in the warm countries; while others, as the glow-worm, crawl perpetually on the earth. It is most probable also, that the sparkling of sea-water is owing to the electricity of the insects which occasion it. Be this as it will, however, from the influences already adduced, it is certain that the electric fluid pervades at all times the whole body of every animal; whence, by exciting or diminishing its action, it is impossible to suppose that many important changes might be made in the human body, and hence the foundation of Medical Electricity.

Though the effects of this fluid as a remedy for diseases fall particularly to be mentioned under the article electricity. MEDICINE, we cannot help here taking notice, that a very strange uncertainty remains concerning what we should imagine to be its first and most obvious effects; namely, whether simple electrification has any effect in quickening and augmenting the pulse? This was said to be the case by the first electricians, but denied by their successors; and even when the great machine at Haarlem is made use of, it still remains doubtful whether there be any effect of this kind or not.

The shock of the Leyden phial having been found effectual in removing some complaints, the use of it was introduced into the common practice of medicine; and is still continued, though a more gentle method of using the fluid is now generally preferred. The apparatus for the medical electrician, besides the machine already described, consists of the following parts. 1. An infusion...
Medical Electricity.

Inflating flood with glass feet, or, what is much better, an arm chair, well rounded at the edges of the wooden parts, and fixed on a large foot with glass feet, which should be at least nine or ten inches in length; for the longer the feet are, the better will the inflation be. The inside part of the back of the chair should move on a hinge, that it may occasionally be let down to the flood, and so the back of the patient be electrified more conveniently; the arms of the chair should be made longer than ordinary. 2. A Leyden bottle with a discharging electrometer. 3. A pair of directors of considerable size, with glass handles and wooden points. 4. A large metallic ball of brass or copper, with a metallic handle to receive the forks. The ball should be unscrewed, and the wire long and sharp pointed to receive the flame of electric fire. 5. A few glass tubes of different bores, some of them with capillary points. 6. Several yards of brass wire or chain; or, which is much better, several lengths of wires with loops at the ends; the part of the wire between these being covered with some non-conducting substance, as a silk ribbon, &c.

The directors are represented by fig. 29. The handles being of glass, one of them having a ball on its end represented by A; the other is without the ball, having its wire bent for the convenience of conducting the electric flame on the eye, &c. Either of the balls may be unscrewed from the wire, and a wooden pin B screwed in its place, or the pointed end of the brass wire used. The glass handles should be held as far from the brass work as possible. To convey the electric fluid to the ear or throat, glass tubes with fiding brass wires through them should be made use of, such as are represented in fig. 30.

Fig. 31, 32, represent the electric forceps, which is thought by some electricians to be more convenient for giving the shock than the directors. Fig. 33. is the medical jar, with an electrometer, that regulates the strength of the shock, and enables the operator to give a feecection of them of nearly equal force. On the upper part of a bent piece of glass G is cemented a brass point D, which is connected to a spring-tube E; a wire F moves in this tube, so that the ball G may be set at any required distance from the ball H. The end of the bent piece of glass is also cemented to a spring tube, which slides upon the wire K, communicating with the inside of the jar.

To use this medical jar, the ball H must be placed in contact with the conductor of the electrical machine, or at least be connected with it by a wire; after which it is to be charged in the usual manner. If a wire proceeds from the ball L to the outside coating, the jar will be immediately discharged, as the accumulation of the electric fluid is sufficiently powerful to pass through the space between the two balls, hence a shock may be communicated to the arm by means of the wires and directors as in the figure, and it will be stronger in proportion as the distance of the ball G from H is augmented. This electrometer acts in the manner of the common discharging rod, and therefore has received the name of the discharging electrometer.

In fig. 4, we have a representation of Mr Lane’s electrometer applied to the machine for medical electricity. G, the lower part of which is inclosed in the pillar F, is made of wood baked and boiled in linseed oil, and bored cylindrically for two-thirds of its length. The brass work is fixed to the pillar by the screw H, and is moveable in the groove I, so that it may be raised higher or lower as the height of the jar D requires. A silk screw L passes through the brass work, having its threads about 1/16 of an inch distant from one another. To the end of this, and opposite to K, is fixed a hemispherical and well polished piece of brass; and a brass ball M, likewise well polished, is fixed to the prime conductor. To this screw is annexed a circular plate O, divided into 12 equal parts; and in every revolution of this screw pointing to the divisions of the scale N, each of which are equal to one turn of the screw. The use of this electrometer is to discharge the jar D, or any battery connected with the prime conductor, when the machine is not applied to medical purposes. If a person holds a wire fastened to the screw H in one hand, and another wire (fixed to E by a loop of brass) passing from the frame of the machine to a tin-plate on which the jar D stands, or the hook E connected with it, he will perceive no shock when X and M are in contact; and the degree of explosion, as well as the quantity of electricity accumulated in the jar, will be regulated by the distance of M and K from each other.

The improved way of applying the discharging electrometer to the conductor, is found to be much more convenient and ready than any other; as it has also the advantage of being useful to a jar or battery of any size. See fig. 6, where a A represents the electrometer as applied to the conductor; c d the improved medical jar suspended at a small distance from it. A small glass tube e f is fixed in this jar, a part of the lower end of which is coated. Two wires pass through the brass ball G on the top of this tube; one of which is connected with the bottom of the jar, and the other goes only to the internal coating of the small tube. The wires are moveable at pleasure, and the jar is suspended from the conductor by a brass ring; and a chain or wire must be fixed on the bottom. From a bare inspection of the figure, it appears that the arm will receive the shock by the discharge of the jar a d; for, by turning the cylinder round, the jar soon becomes charged either with one or both wires in it; and directly as the charge becomes sufficiently strong to pass thro’ the air, it will explode, and the fluid passes to the end of b next to it, going through the wire to the wrist, and from thence up to the other chain at the shoulder. By reverting the positions or the connections of the two wires, the progress of the shock will be reversed, viz. from the shoulder to the wrist. If the short wire alone is left in the jar c d, and the discharging ball of the electrometer is b h, it will be found, on leaving the wire a quarter of an inch from a whole one from the conductor, a most delicate small shock may be given, and repeated any number of times at pleasure. This is called the electrical vibrating shock.

Fig. 31. g represents the bottle director. It is hollow, and coated like a common jar, acting as such, and in some cafes is looked upon as convenient. With this, as with the common director, it is proper to press the ends against the part where the shock is to be applied.

Plate CLXXXV.

Plate CLXXIII.
**Electricity.**

secured to one, two, three, or a greater number of persons. The manner is mild and pleasing, resembling the soft breezes of a gentle wind; generating a gentle warmth, and promoting the secretion and dilatation of tumors, inflammations, &c.

3. By the electric friction.—Cover the part to be rubbed with a woolen cloth or flannel. The patient may be seated in an insulated chair, and rubbed with the ball of a director that is in contact with the conductor; or he may be connected with the conductor, and rubbed with a brass ball which communicates with the ground. The friction thus produced is evidently more penetrating, more active, and more powerful, than that which is communicated by the flesh brush; and there is very little fear of being thought too far gone. This, when used for a few minutes, will be found more efficacious than the other after several hours application.—Electricity applies here with peculiar propriety to spasm, pleurisy, and some stages of the palsy; and in every case answers the end of blunting where the discharge is not wanted, being the most safe and powerful stimulant we know.

4. By taking strong sparks from the patient. Here, as in every other case, the operator may connect the ball of the director with the positive or negative conductor, or he may connect the patient with either of these and the ball with the ground. Now it is clear from what has been already laid down, that if the director be connected with the positive conductor, the fluid is thrown upon the patient, if with the cushion the fluid is extracted from him. Let the patient be insulated, and the action is in some measure reversed; if he is joined to the negative conductor or cushion he will receive a spark from a person standing on the floor; but if he communicates with the positive conductor, he will give the spark to the person on the ground.

5. By causing a current of the electric fluid to pass from one part of the body, and thus confining and concentrating its operation without communicating the shock. Place the patient in an insulated chair, and touch one part of the body with a director, joined to a positive conductor; then with a brass-ball communicating with the ground touch another part; and when the machine is in action the fluid will pass through the required part from the conductor to the ball; the force of the stream will be different according to the strength of the machine, &c. Or connect one director with the cushion and the other with the positive conductor, and apply these to the part through which the fluid is to pass, and when the machine is in action the electricity will pass from one ball to the other. It is not necessary to insulate the patient in this case.

6. By the shock. Which may be given to any part of the human body, by introducing that part of the body into the circuit which is made, between the outside and inside of the bottle. This is conveniently effected, by connecting one director by a piece of wire with the electrometer and the other with the outside of the bottle; then hold the directors by their glass-handles, and apply the balls of them to the extremity of the parts through which the shocks are to be passed. The force of the shock, as we have already observed, is augmented or diminished by increasing or lessening the distance between

**Various methods of applying electricity.**

1. By merely placing the patient in an insulated chair, and connecting him with the prime conductor.—When the machine is in action, he will thus be filled with the electric fluid, which will be continually disipated from the points and edges of his clothes: and though the effects of this are probably too few to be rendered very advantageous, yet a sedentary person might perhaps derive some benefit from sitting in an insulated chair, having before him an insulated table, the chair to be connected with the ball of a large charged jar or battery; by which means a small quantity of the fluid will be continually passing through those innumerable capillary vessels, on the right side of which our health so much depends.

2. By throwing the fluid upon, or extrading it from a patient, by means of a wooden point.—This may be effected in a twofold manner: 1st, by insulating the patient, and connecting him either with the cushion or the positive prime conductor, the operator presenting the point. 2d. Let the patient stand upon the ground, and the wire of the director be connected either with the positive or negative parts of the machine. The sensation produced by the fluid when acting in this manner is mild and pleasing, resembling the soft breezes of a gentle wind; generating a gentle warmth, and promoting the secretion and dilatation of tumors, inflammations, &c.
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between the two balls, which must be regulated by the operator to the strength and sensibility of the patient. Instead of the common bottle, we may have a small one with a glass tube proceeding from it, through which proceeds a wire and hook to hang it upon the machine, with a longer one from the outside coating, and which is to be carried by means of a director to the patient. When this is used as a common bottle, both wires are to be left there, and the shock is communicated by two directors, one connected with the bottom, the other with the top. The operator will often find himself embarrassed in giving small shocks, the fluid passing from the conductor to the ball of the electrometer, instead of going through the circuits he desires: when this happens, which may be known by the chattering noise of the spark, the resistance formed to the discharge is so great, that the fluid cannot force its way through the circuit: to remedy this, pass two metallic pins through the clothing, so that they may be in contact with the skin, which will lessen the resistance and conduct the fluid.

7. By a sensation between a shock and the spark, which does not communicate that disagreeable feeling attending the common shock. This is effected by taking out the long wire from the small medical bottle, and leaving the shorter one which is connected with the top of the jar, the director to be connected and used as before. The effect of this species of shock, if it may be called one, is to produce a great vibration in the muscular fibres, without inducing that pungent sensation which the shock effects. It is therefore applicable to some stages of palsy and rheumatism; it may also serve as an artificial means of excercising.

Fig. 31.

8. By the bottle-director. Infuse the patient, and place one of the balls in contact with him; by which means this director is charged. Now if a wire is conveyed from the bottom of this to the top of another director, the bottle-director will be discharged whenever the other ball is brought in contact with the patient; so that by bringing it down with rapidity, any number of small shocks may be procured in a minute: or connect the infused patient with the top or inside of a large charged jar, and then this apparatus used in the foregoing manner will discharge from the large jar at each spark its own contents, and by repetition discharge the whole jar: thus a number of shocks may be given without continually turning the machine or employing an aid.

9. By passing the whole fluid contained in the Leyden phial through a disused part without giving the shock. Connect a director, by means of a wire, with the ball of a Leyden jar; charge the jar either completely or partially, and then apply the ball or point of the conductor to the part intended to be electrified, and the fluid which was condensed in the phial will be thrown on the part in a dense flow stream, attended with a pungent sensation which produces a considerable degree of warmth. If a wire that communicates with the ground is placed opposite to the end of the director, the passage of the fluid will be rendered more rapid, and the sensation stronger. Or infuse the patient, connect him with the top of a jar, charge this, and then apply a metal wire or piece of wood to the part thro' which you mean to make the fluid pass. It is obvious, that in this case the circuit between the inside and the outside of the jar is not completed, therefore the shock will not be felt. The condensed fluid passes in a dense flow stream through the required part, while the outside acquires a sufficient quantity from substances near it to restore the equilibrium.

It is in all cases most advisable to begin with the more gentle operations, and proceed gradually to increase the force as the strength and constitution of the patient or the nature of the disorder requires. The stream from a wooden point, a wooden ball, or brazen point, may be first used: sparks, if necessary, may then be taken, or small shocks given.

In rheumatic cases the electric friction is generally used. If the pains are local, small shocks may be given. To relieve the toothache, very small shocks may be passed through the tooth; or, cover the part affected with flannel, and rub it with a director communicating with the machine.

In inflammations and other disorders of the eyes, the fluid should be thrown from a wooden point: the sensation here produced is that of a gentle cooling wind; but, at the same time, it generates a genial warmth in the part affected.

In palsy, the electric friction and small shocks are administered. Streams of the fluid should always be made to pass through the patient.

The only treatise we have yet had from the faculty on the subject of medical electricity is a pamphlet intitled, Considerations on the Efficacy of Electricity in removing Female Obstructions, by Mr Birch; and if its merits were to be confined to this diffuse alone (in which it may be reckoned a specific), it would be intituled to the attention of practitioners; but we have reason to expect much more from it, since the prejudices of the faculty seem removed, and the practice is becoming more general every day.

SECTION XIII. Of the Uses of the Electric Fluid in the System of Nature at large.

These are so many and so various, that it may be said without much exaggeration, that whether we look to the heavens above or to the earth beneath, we can scarce perceive anything that is not acted upon, and in a manner perfectly subjected to the operations of this wonderful fluid. If we attend to the common phenomena of our atmosphere, experiments show that electricity is connected with every one of them. If in the production of clouds, rain, hail, snow, we evaporate water by means of heat, it appears from the experiments of M. Sauvage, related n° 201. at fig. 8, that a strong electricity is produced. If vapour be condensed into rain, a quantity of electricity is also produced; and if water is frozen into ice, if it descends in hail or snow, electricity appears to be equally concerned. When clouds emit their electricity in great quantities, they instantaneously dissolve in rain; which is more or less heavy according to the quantity of electricity discharged, as in thunder-forms; and when this quantity is excessive, a vast many discharges are frequently made before the rain can descend. Hence it is reasonable to conclude, that though heat may be the cause of the first rise of vapour, it is the electric fluid which unites it with the air in such a manner as to be a
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USE.

This is confirmed by an observation related under the article CLOUD; namely, that small clouds floating in the atmosphere will frequently be seen to attract one another, and so meet together; after which, if they have been of nearly an equal size, both will almost instantly vanish. Transparency itself, as we have seen in many instances through the course of this treatise, depends on the vibratory motion of the electric fluid; and when we are assured that it depends on this in several cases, we may conclude from analogy that it does so in all. In the case of vapour dissolved in the atmosphere, therefore, as long as this particular motion continues through it, the vapour remains dissolved and transparent; but when the electricity comes to be dispersed to assume the other motion, of which it is exceedingly susceptible, viz. that of running in a stream from one place to another, the vibratory motion ceases, the vapour formerly dissolved loses its transparency, and appears in the form in which it was originally raised by heat, viz. that of an opaque smoke or mist. As this mist must always be electrified (for it is in the disposition of the fluid to fly to a distant place when electricity conducts), the fluid then begins to exert its power of attraction, and the mist collects in bodies larger or smaller according to the quantity of motion with which the electric matter is affected: and thus we see how by means of this disposition of the fluid, cloudy weather, rain, or the most violent thunderstorms, may be produced. On looking farther into the operations of nature, we find the electric fluid acting in a still higher capacity, and regulating the temperature of the different climates throughout the world. Under the article CHEMISTRY, No. 99, it has been shown, that what is heat in summer becomes electric fluid in winter; and under the article COLD, it has been shown that cold as well as heat is a positive substance. In the present treatise it has been proved at length, that the electric fluid and the light of the sun are the same; the former being in truth no other than the solar light absorbed by the earth, entangled among its particles, becoming subject to new laws, and acting in many cases as if it were a different fluid. Hence it becomes a proper antagonist to the light itself: for as the latter is only the fluid of electricity moving in a vibratory manner, and what we call electricity is the same fluid either in a comparatively stagnant situation, or dispersed to run with violence from one place to another; it is plain that the motion of the light must be opposed by the fluid 'tho' stagnant, and much more if it be moving in an opposite manner. But the action of light when augmented is heat: the power which opposes it therefore, i.e. the electric fluid moving in an opposite direction, as explained under CHEMISTRY, No. 102, is cold itself; and hence the strong electric appearances in the atmosphere in cold countries, or in cold weather even in our own country. Hence also the electricity of the serene sky is weaker in summer than in winter; and Isis in the combustion, which is a very strong vibratory action of system of the electric matter, produces no electricity, the one action being inconsistent with the other. The electric fluid therefore regulates the light and heat of the sun throughout the whole world, and is itself regulated by them; so that neither heat nor cold can ultimately predominate anywhere.

Defending from the atmosphere into the earth itself, we find the electric matter no less concerned in many various ways in the substance of the earth itself. As in this, we observe, that is vibratory motion probably gives transparency to all bodies. Sometimes this motion is augmented to a great degree, as in the waters of the ocean, which become unusually clear before tempests and hurricanes. Its action in producing earthquakes is explained at large under the article EARTHQUAKE, as well as in setting fire to volcanoes under the article VOLCANO. Like other fluids, its action seems to gain a much increas de of power when its runs for a considerable way along any conductor. This may be easily conceived from the consideration, that the fluid, in passing from one place to another, is augmented by a fluid of the same kind, which continually accelerates its motions, and at last gives them an intensity capable of acting as the most vehement fire. The fact has been long observed, and is confirmed by the experiments of Mr Wilton in the pantheon as well as by those of later electricians. In the former, the spark taken from a vast conductor of 155 feet in length, was so strong that it resembled the discharge of a large jar, or rather a small battery; and was so very pungent, that few who had tried it once would venture on a second experiment. The last experiments were made with a number of tin conductors joined to each other; and in which situation it was found that the spark taken from them was much stronger than when they were laid at each other's sides, though the surface was in both cases exactly the same. Hence we see, that if by any means the electric fluid shall meet with an unusually good conductor for a considerable way through the earth, the extremity of that conducting part may be heated, set on fire, or violent explosions issue from it; and the same thing will take place in the atmosphere. Upon this principle then we may account for natural hot-baths; explosions suddenly issuing from the earth, by which people have sometimes been killed; clouds and whirlwinds charged with an enormous quantity of electricity, and far beyond what in the ordinary way they could contain, &c.

Thus, to the action of the electric fluid we are in an especial manner to ascribe the temperature of the air terrestrial throughout the whole globe; all the phenomena of phenomena, rain, snow, hail, lightning, tempests, and in all probability the currents of air itself named winda. Certain it is at least, that every electrified substance has an atmosphere round it resembling a gentle blast of

(v) In this there appears some inaccuracy of expression; but as it is somewhat difficult to find terms at once sufficiently accurate and intelligible, we shall here observe, that by the word heat we mean the electric or universal fluid moving in a certain manner, viz. from a centre to the circumference; by cold, the same fluid preying from a circumference to a centre; by the electric fluid simply, the same either comparatively stagnant, or moving in any other way than those just mentioned.
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373. Is probably the cause of vegetation.

The effects may be summarized as follows: even by the most violent blast of air we can imagine, an undoubted evidence of this is, that if you let up a small ball or pointed body upon the conductor of a strong machine, so that a flame of electric light may rise from it, it will not be in your power to turn the flame aside in the smallest degree by the most violent blast of a bellows. On the contrary, if any body is presented to it which has a tendency to attract, the flame will move across the blast of air directly contrary to it, or in the same direction with it, in the very same manner as if no such thing was present. As the electric fluid therefore acts independent of the air, and cannot have its motions controlled by it, it is highly probable that all the motions of the atmosphere, are controlled by this fluid alone; and indeed if we allow it to be the proper antagonist to the light of the sun itself, we must readily allow it also to be the regulator of every other power on this earth.

In electricity having been treated of in the last section, we cannot certainly say that it is the original cause of this process. It seems, however, to be the true cause of CRYSTALLIZATION; which, as remarked under that article, probably is only an incident or imperfect vegetation. The most convincing proof of this is from the experiments of Mr. Lichtenberg with a large electrophorus; in which the knob of an electrified phial being drawn over the surface of the electric plate, finely powdered rosin afterwards sifted upon the plate assumed the figure of stars and other beautiful ramifications, indicating not only an inclination to arrange itself in the same regular order with the crystals of salts, but to run out into branches like those of vegetation. These experiments have been repeated to great advantage by the Reverend Mr. Bennet, according to whose method the figures represented in Plate CLXXXIX were made. The apparatus used for making them consisted only of a common Leyden phial, and a plate of glass 15 inches square covered on one side with a varnish of gum-lac dissolved in spirit of wine (q), and several times laid over. The other side is covered with tin-foil laid on with common paste. When it is to be used, the glass-plate is put upon a metallic stand with the tin-foil laid underneath; the phial is to be charged, and the knob drawn over the varnished side. This kind of figure may be drawn or letters made as represented in the plate; and from every figure beautiful ramifications will proceed, longer or shorter according to the strength of the charge. On some occasions, however, the charge may be too strong, particularly where we wish to represent letters, so that the whole will be blended into one confused mass. The round figures are formed by placing metallic rings or plates upon the electrical plate; and then giving them a spark from the electrified bottle, or blowing a shock through them. The figures may be rendered permanent by blowing off the loose chalk, and clapping on a piece of black-sized paper upon them; or if they are wanted of another colour, they may easily be obtained by means of lake, vermillion, rose-pink, or any of the ordinary colours ground very fine. The easiest way of applying them seems to be by a barber's puff-bellows.

This tendency of the electrical fluid to produce ramifications in its passage through other substances, is likewise evident from the figure of the positive flashes described by Mr. Nicholson, and represented in Plate CLXXXVIII. It may indeed be objected, that in both cases the fluid has to make its way through non-conducting substances, where it meets with a considerable resistance; so that the cause cannot be applicable to vegetation, where a ready conductor is always found in the moisture with which the earth abounds. But if we consider that the earth, and everything contained in it, is already saturated with electric matter, it must readily appear that no new quantity can be forced into it without meeting with a considerable resistance; and therefore it will branch out and divide in every very manner when passing through the earth, that it does not uninterruptedly flow through the air, or moisture, but diffuse itself on the surface of an electric substance. If in the earth it meets with such particles as serve to facilitate its passage, these will be arranged according to the direction of the fluid itself; and thus those particles being consolidated by other powers, or by electricity itself acting in a different manner, may be supposed to assume the figures of branched roots; while the continual accumulation of new matter augments them into bulk, and is what we call the growth of the plant, or its drawing nourishment from the ground. It is not indeed pretended that we can explain the manner in which plants grow; the utmost we can do is to attain some slight and general idea of the cause, and how by the action of that cause, directing itself according to the laws given it by the author of nature, the effects may be produced. This is sufficient to satisfy the curiosity natural to the human mind; a further knowledge would not only be entirely useless, but in all probability is inconsistent with the limited state of our faculties at present. What is here said concerning vegetation may be applied equally to the formation and growth of animal bodies; but this subject is still more obscure and difficult: it has been supposed by many, however, that the nervous fluid is the same in both cases. They imagine that the reason why the nervous fluid is so much more ready to the magnetic influence, is from the great magnitude of its particles, and from the strong action of the magnet; and this, by repeated experiments, has been proved to depend on electricity. MAGNETICAL kind.

274. When we consider the rest of the terrestrial phænomena, the cause may be, that the electric fluid concerned in every one of them, or rather acting as their only cause. There is not in nature a more surprising phenomenon, than that of attraction of the magnet; and this, by repeated experiments, has been proved to depend on electricity. MAGNETICAL kind.

Nails, needles, and many other bodies have been endowed with their virtue by means of artificial electricity; and iron has been known to receive it from lightning: whence we may reasonably conclude, that the power of the magnet at all times depends upon the secret operation of the electric fluid. By extending its power to the production of attractive and repulsive forces in all cases, and which from many

(q) Two ounces of shell-lac powdered and mixed with fix ounces of spirit of wine answers very well for this purpose. The glafs must be warmed, and the varnish spread upon it with a camel's hair pencil. Care must be taken, however, not to lay it on too thick, otherwise the effect will not follow.
ElectriCity.

Sect. XIII.

Uses in the Natural phenomena is extremely probable, we shall fill give it a higher rank in the system of nature. We shall now find it guiding the planets in their courses through the heavens, giving stability and cohesion not only to terrestrial substances, but to the globe of earth itself, and to all other bodies in the universe.

A system of natural philosophy on this principle was begun in the year 1747, and lately published by the Count de Trelion. In this the electric fluid is considered as the first principle of motion in the universe, and the immediate agency by which the system of nature is governed. According to him, the fixed stars themselves are no other than as many foci of action communicating electricity to their surrounding planets, which have electric atmospheres of different extents. He shows the operation of the fluid in all the different phenomena of earth, air, water, fire, &c. concluding even to the most minute, as well as considering the most grand and sublime, exhibitions of nature. That there is but one medium capable of imitating many of these phenomena, is certain; as for example, those of earthquakes, water-spouts, tides, &c. of which an account is given under their proper articles. By means of the same fluid also we may imitate the planetary motions; and for this several contrivances have been upon: the principal are as follow.

1. From the prime conductor of an electric machine, suspend six concentric hoops of metal at different distances from one another, in such a manner as to represent in some measure the proportional distances of the planets. Under these, and at the distance of about half an inch, place a metallic plate, and upon this plate, within each of the hoops, a glass-bubble blown very thin and light. On electrifying the hoops, the bubbles will be immediately attracted by them, and will continue to move round the hoops as long as the electrification continues. If the electricity is very strong, the bubbles will frequently be driven off, run hither and thither on the plate, making a variety of surging motions round their axis; after which they will return to the hoop, and circulate as before; and if the room is darkened, they will all appear beautifully illuminated, and will continue thus to circulate.

2. Provide a ball of cork about three quarters of an inch in diameter, hollowed out in the internal part by cutting it in two hemispheres, scooping out the inside, and then joining them together with paste. Having attached this to a silk thread between three and four feet in length, suspend it in such a manner that it may just touch the knob of an electric jar, the outside of which communicates with the ground. On the first contact it will be repelled to a considerable distance, and after making several vibrations will remain stationery; but if a candle is placed at some distance behind it, so that the ball may be between it and the bottle, the ball will instantly begin to move, and will turn round the knob of the jar, moving in a kind of ellipse as long as there is any electricity in the bottle. This experiment is very striking, tho' the motions are far from being regular; but it is remarkable that they always affect the elliptical rather than the circular form.

3. Cut a piece of India paper in the shape of an isosceles triangle, whole sides are about two inches long, and two-tenths of an inch in breadth; then erect a brass ball of two or three inches in diameter on a brass wire one-sixth of an inch in thick. Use in this, the nets, and two feet six inches long, on the prime conductor: electrify the conductor, and then bring the obtuse end of the piece of paper within the atmosphere of the ball; let it go, and it will revolve round the ball, turning often round its own axis at the same time.

We shall not here enter into any speculations concerning the way in which it might be supposed possible to produce the planetary motions by means of the electric fluid of the sun's light, and the return of the electric fluid towards him. Before we can make excursions into these celestial spaces, it is absolutely necessary to remove an objection derived from Mr Morgan's experiment, that the electric fluid cannot pervade a perfect vacuum; and from which he concludes, that the electric fluid cannot pass beyond the limits of our atmosphere. On this experiment, however, we must observe, that though it were really proved in a much more decisive manner than is done by this experiment, that the fluid cannot be artificially driven through a vacuum, this would not prove that it cannot naturally pass through it, unless we should suppose the powers of nature and of art to be equal to one another. But that even the powers of art, in Mr Morgan's experiment, have not a fair chance of success, is evident from an inspection of fig. 80. Here he endeavors to force the electric fluid through a long course of perfect vacuum, and finds the power of his machine insufficient for the purpose. Yet one of Mr Morgan's own experiments might have led him to vary this one in such a manner as would perhaps have shown the possibility of transmitting the fluid through the most perfect vacuum that can be made. He informs us, that a spark, which in the open air cannot exceed one quarter of an inch diameter, will appear to fill the whole of an exhausted receiver four inches wide and eight inches long; tho' in the latter case it will be excessively faint in comparison with what it would have been in the atmosphere, yet, in order to prove that the faintness of the electric light in vacuo depends on the enlarged space through which it is diffused, we have only to introduce two pointed wires into the vacuum, so that the fluid may pass from the point of the one to the point of the other; and when the distance between them is not more than the tenth of an inch, in this case we shall find the spark as bright as in the open air.

The inference to be derived from this experiment is obvious. Had Mr Morgan, instead of attempting to cause the fluid pass through the whole length of the vacuum, put two wires in the inside at a small distance, from each other, as described in the experiment just now mentioned, it is very probable that the fluid would have made its way through that small distance. It must be acknowledged, indeed, that considering the very great difficulty of making this experiment at any rate, we could scarce expect that this additional trouble could be taken: but without this, or something equivalent, his conclusion cannot by any means be allowed to be just; nor, even if it had been tried, would it have determined the question in his favour.

The great difficulty in this experiment is to give a reason why in a certain degree of exhaustion the vacuum should be so easily penetrated by the fluid, and in another should make such resistance; but the following considerations will probably throw some light on this.
ELECTRICITY

Plate CLXX

Elephas
ELECTRICITY.

In all cases where the fluid is obliged to pervade the substance of any medium whatever, it moves with difficulty. Thus, if a vast quantity of electricity is sent through a small wire, the resistance it meets with is so great that the wire becomes heated with violence; and if the battery is large, it cannot be totally discharged, as was the case with Dr Van Marum's battery, mentioned, n° 150. Again, if the spark be taken in water, a most violent explosion takes place; and yet both metals and water are good conductors of electricity. 2. In all cases where we let the electric fluid in motion, the utmost we can do is to give it a tendency to move with, is to deprive it of its motion in a certain direction; and form a communication between that and another part of the earth, the circulation will go on very readily, and the fluid will easily return to the place from whence it came. If the communication between the earth and conductor be cut off by an electric, the circulation will nevertheless go on; the fluid will evaporate in the air, and thence reach the earth by channels invisible to us. The effect will be the same in all cases where its motion in a certain direction is stopped: but what we call stopping it, is only rendering its passage more difficult in one particular place than in another; for as to any absolute stop or impediment, such as could reft the whole force of the fluid, as Mr Morgan supposes, there is not the least probability that it exists in nature. The whole that can be inferred from Mr Morgan's experiment therefore is, that the electric fluid will more readily evaporate and pass silently thro' the air than through a complete vacuum. The question, however, still recurs: Since this fluid passes very readily thro' rarefied air, why does it hesitate after a certain degree of rarefaction, and at last stop altogether when the air is totally exhausted? To this it may be replied, that when air is heated it becomes lefs electric than when cold, and by an increase of heat becomes at last an excellent conductor. On the other hand, by an increase of cold its electric properties become proportionally greater, and consequently the difficulty with which the fluid gets thro' it increases in proportion.

Under the article Elastic Vapours, it is shown that the true principle of elasticity is heat; and under the article Chemistry, n° 90, it is shown, that heat and electricity are convertible into one another. In proportion as the air is rarefied, therefore, it absorbs heat, and consequently becomes better conductor; but when it is totally exhausted, nothing remains but the fluid of electricity itself; the same with that of heat, but deprived of motion, and consequently capable of making a much greater resistance. Now the strongest spark that can be drawn from any of our machines, perhaps does not equal 1/14 of an inch in diameter, as appears from the holes made by them in paper or cards when pierced, as directed in Sect. VIII. But when a perfect vacuum is made, this small spark is obliged to act upon a cylinder of electric matter perhaps 6000 or 7000 times greater in diameter than itself, each point of which will be the sole power the explosion itself has; and what is worse, the whole of this must be put in motion before any discharge can be made. The resistance therefore is so great, that the fluid rather passes through the air as already explained: nevertheless, if it were possible to make a perfect vacuum of no greater diameter than that of the electric spark, there is no reason to suppose that it would not be penetrated by it; and of this Mr Morgan's experiments with the two wires above mentioned seems to be a confirmation.

On the whole, it is evident, that we cannot from this, or indeed any other experiment, argue against the possibility of the passage of the electric fluid from any part of the creation to another. We cannot force it, it is true, because it is opposed by its own natural laws to resist our efforts; but where it is dispofed by these laws to yield in one place, there will undoubtedly be a current of it either from some other, which we would find ourselves equally unable to stop by all the machines that ever have been or will be invented. There is as yet therefore not the least proof that the electric fluid does not pervade the most distant regions of space, and therefore perform all those great operations which have been ascribed to unknown and inexplicable powers. For a further account of the operations of this fluid in producing the phenomena of nature, see the articles, Atmosphere, Atmno Borealis, Earthquake, Hail, Hurricane, Lightning, Meteor, Rain, Snow, &c.

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ELEGANCE, (from eligo “I choose,”) denotes a manner of doing or saying things politely, agreeably, and with choice. With choice, so as to rise above the common manners; politely, so as to strike people of delicate taste; and agreeably, so as to diffuse a relish which gratifies everybody.

Elegance, in oratory and composition, an ornament of politeness and agreeableness shewn in any discourse, with such a choice of rich and happy expressions, as to rise politely above the common manner, so as to strike people of a delicate taste.

It is observed, that elegance, though irregular, is preferable to regularity without elegance: that is, by being so scrupulous of grammatical construction, we lose certain licences wherein the elegance of language confits.

ELEGIAE, in ancient poetry, any thing belonging to elegy. See ELEGY.

ELEGIT, in law, a writ of execution, which lies for a person who has recovered debt or damages, or upon a recognizance in any court, against a defendant that is not able to satisfy the same in his good faith. ELEGY, a mournful and plaintive kind of poem. See the article POETRY.

ELEMENTS, in physics, the first principles of which all bodies in the system of nature are composed.

These are supposed to be few in number, unchangeable, and by their combinations to produce that extensive variety of objects to be met with in the works of nature.

That there is in reality some foundation for this doctrine of elementary bodies is plain; for there are some principles evidentely exempted from every change or decay, and which can be mixed or changed into different forms of matter. A peron who surveys the works of nature in an inattentive manner, may perhaps form a contrary opinion, when he considers the numerous tribes of fouls, plants, and animals, with the wonderful variety that appears among them in almost every instance. He may from thence be induced to conclude, that nature employs a vast variety of materials in producing such prodigious diversity. But let him inquire into the origin of this apparent diversity, and he will find that these bodies which seem the most different from each other are at bottom nearly the same. Thus the blood, chyle, milk, urine, &c. as well as the various solid parts of animals, are all composed of one particular substance: grats, for instance, by the affinity of air and water, and even sometimes of very insipid kinds of grafts. The same simplicity presents itself in the original composition of the nourishment of vegetables, notwithstanding the variety among them with respect to hardness, softness, elasticity, taste, odour, and medical qualities. They chiefly depend, for thefe, upon water and the light of the sun; and the same simplicity must take place in animals that are fed on vegetables. The analysis of animal substances confirms this hypothesis; for they can all be reduced into a few principles, which are the same in all, and only differ with regard to the proportions in which they are combined. With regard to animals, the cafe appears to be the same: and the more we are acquainted with them, the more we have to believe that the variety in their origin is very small.

Notwithstanding the infinite variety of natural productions, therefore, it appears, that the materials employed in their production are but few; that these are uniformly and certainly the same, totally exempted from any change or decay; and that the constant and gradual change of one body into another is produced by the various separations and combinations of the original and elementary parts, which is plain from the regularity and uniformity of nature at all times. There is a change of forms and combinations through which it passes, and this has been the case from the earliest accounts of time; the productions of nature have always been of the same kind, and succeeded one another in the same order. If we examine an oak, for instance, we find it composed of the same matter with that of any other that has existed from the earliest ages. This regularity and uniformity in the course of nature shows that the elementary parts of bodies are permanent and unchangeable: for if these elementary particles which constituted an oak some thousand years ago, had been undergoing any gradual change, the oaks of the present times would have been found considerably different from those that existed long ago; but as no difference has been observed, it would seem that the ultimate elements of bodies have always continued the same.

Reflections of this kind have suggested an idea of several principal elements of which all other bodies are composed, which by their various combinations furnished all the variety of natural bodies. Democritus, and other great philosophers of antiquity, fixed the number to four, which have retained the name of elements ever since. These are, fire, air, earth, and water; each of which they imagined was naturally disposed to hold its own place in the universe. Thus, the earth, as heaviest, naturally tended towards the centre, and occupied the lower parts; the water, as approaching next to it in gravity, was spread chiefly on the outside of the earth; the air, being more subtle and rare, occupied the middle place; while the fire, being still more subtle and active, receded to the greatest distance of all, and was supposed to compose the planets and stars. This system was extended to all the productions of nature. Meteors were produced from a combination of fire and air; animals were considered as composed of earth and water; and those that were warm had likewise a proportion of the element of fire. Thus they went on, explaining some of the most striking qualities of the several productions of nature from the different proportions of the four elements they contained.

But though this system appears not at all deficient of beauty and propriety, and on this account has been in some measure received even to the present time, we find reason to doubt whether these four substances be really elementary bodies; nor do they answer our purpose in forming a system, as we know too little of the intimate structure and texture of them to enable us to explain other bodies by them.

Any other attempts that have been made to assign the number of elementary bodies have been much less fortunate. The chemists, with Paracelsus at their head,
the elements, whatever they are, must necessarily be invisible or imperceptible by any of our senses. An inquiry into their number or properties therefore must be attended with very little success; and all the knowledge we can have upon the subject must be drawn from a view of their combinations, and reasoning analogically from the transmutations we observe to take place in nature. The modern discoveries in aerology have enabled us to proceed farther in this way than what it was possible for the ancient philosophers to do. We now find that all the different kinds of air are composed of that invisible and fubtile fluid named heat, united in a certain way with some other substance: by which union the compound acquires the properties of gravitation, expansion, rarefaction, &c. for pure heat, unites when united with some terrestrial substance, neither gravitates nor expands. This is evident from the phenomena of the burning-glass, where the light concentrated in the focus will neither heat the air nor water, unless it meets with something with which it can form a permanent union. Heat therefore is justly to be considered as one of the original elements; being always capable of uniting with bodies, and of being extricated from them unchanged; while the same bodies are by their union with it changed into various forms; water, for instance, into ice or vapour, both of which return into their original state by the abstraction or addition of heat in a certain degree. Hence it becomes almost natural to conclude, that there are only two elements in the universe: and this opinion we find adopted by several philosophers, particularly the Count de Trefcan in his Essay on the Electric Fire. In this doctrine, two primitive material substances seem to exist in nature; one that incessantly acts, and to which it is essential to be in motion; the other absolutely passive, and whose nature it is to be inert, and move entirely as directed by the former. Should this doctrine be adopted, little difficulty would occur in determining the active matter to be that universal fluid which in its various modifications of heat, light, and electricity, has such a share in the operations of nature. But in fixing on the passive element we are greatly embarrassed; nor are the discoveries in aerology or any other science as yet able to remove the difficulty entirely. In our experiments on this and some other parts of chemistry we find three things that seem to be unchangeable, viz. earth, phlogiston; and that invisible, though terrestrial and gravitating principle called the antiphlogiston the oxygenes or acidifying principle, and by the phlogistians the basis of phlogisticated air. In our experiments on the first, we find that earth, the vitrified by the most intense fire, may be recovered in its proper form; and some very pure earths, particularly magnesia alba, cannot be changed even in the focus of the most powerful mirror. In like manner we may distil charcoal in vacuo by the solar rays, and the compound is inflammable air: we may decompose this compound by a metallic calx, and we have our charcoal again unchanged, for all metals contain charcoal in substance. Let us try to destroy it by common fire, and we have it then in the fixed air produced, from which it may be recovered unchanged by means of the electric spark. With the basis of dephtlogisticated air the calx is still more difficult; for we cannot by any means procure a light of it by itself. We may combine it with heat, and we have dephtlogisticated air; to the compound we may add charcoal, and we have fixed air, by decomposing the former by burning iron in it, we have the metal greatly increased in weight, and a some unknown substance; and if we attempt to separate the latter, we have water, or some kind of vapour, which still conceals it from our view.

In some experiments made by Mr Watt, and of which an account is given under the article Acid, we find that nitrous acid might be phlogisticated by the purest earth or metallic calx; whence it is not unreasonable to suppose that phlogiston may be only a certain modification of earth, and not an element distinct from it: but with regard to the basis of dephtlogisticated air, no experiment has ever shown that it can either be procured by itself, or changed into any other substance; so that it appears to have the nature of an element as much as light or heat. Though we should therefore be inclined to divide the whole matter of the universe into two classes, the one active and the other acted upon, we must allow that the passive matter even on this earth is not precisely of the same kind: much less are we to extend our speculations in this respect to the celestial regions; for who can determine whether the substance of the moon is the same with that of our earth, or that the elements of Jupiter are the same with those of Saturn? There is even a difficulty with regard to the division which seems so well established, viz. of matter in general into active and passive; for no person can prove, that the matter which is active in one case may not be passive in another; and occasionally it seems to us that the active matter is composed of many elements, or of one element; and of the nature of these elements, or of the single one, we know nothing.

In a figurative sense, is used for the principles and foundations of any art or science; as Euclid's Elements, &c.

Elements, in astronomy, are those principles deduced from astronomical observations and calculations, and those fundamental numbers which are employed in the construction of tables of the planetary motions. Thus, the elements of the theory of the sun, or rather of the earth, are his mean motion and eccentricity, and the motion of the aphelia. The elements of the theory of the moon are its mean motion; that of its node and apogee, its eccentricity, the inclination of its orbit to the plane of the ecliptic, &c.
ELEMI, or ELEMY, in the materia medica. See ANTRIS.

ELENCHUS, in antiquity, a kind of ear-rings set with large pearls.

ELEPHANT, in logic, by the Latins called argumentum and inquisitio, is a vicious or fallacious argument, which deceives under the appearance of truth; the same with what is otherwise called sophism.

ELEPHANT, in zoology. See ELEPHAS.

American ELEPHANT: An animal only known in a fossil state, and that but partially, from the teeth, some of the jaw-bones, the thigh-bones, and vertebrae, found with many others five or six feet beneath the surface on the banks of the Ohio. But these bones differ in several respects from those of the elephant; for which, see Fossil Bones. As yet the living animal has evaded our search. Mr Pennant thinks it more than probable, that it still exists in some remote parts of the vast new continent unexplored yet by Europeans. Providence maintains and continues every created species; and we have as much assurance that no race of animals will any more cease while the earth remains, than feed-time and harvest, cold and heat, summer and winter, day or night. See MAMMUTH.

ELEPHANT-Biscuit. See SCARABÆUS.

Knights of the ELEPHANT, an order of knighthood in Denmark, conferred upon none but some persons of the strict quality and merit. It is also called the order of St Mary. Its institution is said to have been owing to a gentleman among the Danish croises having killed a elephant, in an expedition against the Saracens, in 1184; in memory of which, king Canutus instituted this order, the badge of which is a towered elephant, with an image of the holy virgin encircled with rays, and hung on a watered sky-coloured ribbon, like the George in England.

ELEPHANTA, a small, but very remarkable island about five miles from the castle of Bombay in the East Indies. Of this we have the following description in Mr Grose's Voyage to the East Indies. "It can at most be about three miles in compass, and consists of almost all hill, at the foot of which, as you land, you see, just above the shore, on your right, an elephant, coarsely cut out in stone, of the natural bigness, and at some little distance not impossible to be taken for a real elephant, from the stone being naturally of the colour of that beast. It stands on a platform of stones of the same colour. On the back of this elephant was placed, flanding, another young one, appearing to have been all of the same stone, but has been long broken down. Of the meaning, or history of this image, there is no tradition old enough to give any account. Returning then to the foot of the hill, you ascend an easy flant, which about half way up the hill brings you to the opening or portal of a large cavern hewn out of a solid rock, into a magnificent temple: for such rarely it may be termed, considering the immense workmanship of such an excavation; and seems to me a far more bold attempt than that of the pyramids of Egypt. There is a fair entrance into this subterraneous temple, which is an oblong square, in length about 80 or 90 feet, by 40 broad. The roof is nothing but the rock cut flat at top, and in which I could not discern any thing that did not show it to be all of one piece. It is about 10 feet high, and supported towards the middle, at equidistance from the sides and from one another, with two regular rows of pillars of a singular order. They are very massive short in proportion to their thickness, and their capitals have some resemblance to a round cushion preyed by the superincumbent mountain, with which it is attached also of one piece. At the further end of this temple are three gigantic figures; the face of one of them is at least five feet in length, and of a proportionable breadth. But these representations have no reference or connection, either to any known history or the mythology of the Gentoo. They had continued in a tolerable state of preservation and wholeness, confidering the remoteness of their antiquity, until the arrival of the Portuguese, who made themselves masters of the place; and in the blind fury of their bigotry, not suffering any idols but their own, they must have even been at some pains to maim and deface them, as they now remain, considering the hardneis of the stone. It is said they even brought field-pieces to the demolition of images, which so greatly deferred to be spared for the unequalled curiosity of them. Of this Queen Catherine of Portugal was, it seems, so sensible, that she could not conceive that any traveller would return from that side of India without visiting the wonders of this cavern; of which too the light appeared to me to exceed all the descriptions I had heard of them. About two-thirds of the way up this temple, on each side, and fronting each other, are two doors or outlets into smaller grots or excavations, and freely open to the air. Near and about the door-way, on the right hand, are several mutilated images, finely carved in groups. In one of the last, I remarked a kind of resemblance to the story of Solomon dividing the child, there standing a figure with a drawn sword, holding in one hand an infant with the head downwards, which it appears in act to cleave through the middle. The outlet of the other on the left hand is into an area of about 20 feet in length and 12 in breadth; at the upper end of which, as you turn to the right, presents itself a colonade covered at top, of 10 or 12 feet deep, and in length answering to the breadth of the area: this joins to an apartment of the most regular architecture, an oblong square, the door in perfect symmetry; and the whole executed in quite a contrary taste and manner from any of the oldest or best Gentoo buildings any where extant. I took particular notice of some paintings round the cornices, not for any thing curious in the design, but for the beauty and fineness of the colouring, which must have lasted some thousands of years, on supposing it, as there is all reason to suppose it, contemorary with the building itself. The floor of the apartment is generally full of water, its pavement or ground-work not permitting it to be drawn off or to be flooded up. For it is to be observed, that even the cavern itself is not visitable after the rains until the ground of it has had time to dry into a competent hardneis."

ELEPHANTIASIS, called also the lepra of the Arabians, in medicine, a chronic disease, one of the two species of leprosy which affects the whole body, where even the bones as well as the skin are covered with spots and tumours, which being red at last turn black. See Medicine-Index.

ELEPHANTINE, or ELEPHANTIS (anc. geog.), an island in the Nile to the south of Syene; with a cognominal name, where the navigation on the Nile ends, became
because just below the left cataract. And here to the
weft of the Nile flood the left Roman garrifon (Notii-
ia Imperii).

ELEPHATINE, in Roman antiquity, an appella-
tion given to the books wherein were registered the
translations of the feminine and magistrates of Rome, of
the emperors or generals of armies, and even of
the provincial magistrates; the births and eulogies of
the people, and other things relating to the census.

They are supposed to have been called, as being made
of leaves or petioles of elephants taken.

ELEPHANTOMACHI. See ETHIOPIA.

ELEPHANTOPUS, in botany: A genus of the
polygama segregata order, belonging to the synge-
nea class of plants; and in the natural method rank-
ning under the 49th order, Composite.

The calyx is quadriflorous, with hermaphroditic florets ligulated
or plane; the receptacle is naked; the pappus bristly.

ELEPHAS, the ELEPHANT, in zoology, a genus
of quadrupeds belonging to the order of bruta. The
characters are these: The elephant has no fore-teeth in
either jaw, and the dog-teeth are very long; the prob-
obis or trunk is long, and capable of laying hold of
any thing; and the body is somewhat naked.

The trunk of an elephant is about
the largest of all animals. From
the front to the origin of the tail he is generally about
16 feet long, from the end of the trunk 25 feet, and
about 14 feet high. The circumference of the neck is
17 feet, and the circumference of the body at the
groin part 25 feet 10 inches; the tail is about 6 feet
long, and 2 in circumference. The circumference of
the legs is about 6 feet. These are the largest dimen-
sions. But the animal differs in size in different
countries; in one not exceeding 7 feet in height.

The eyes are small in proportion to the size of the
animal. The muzzle is very different from that of
other quadrupeds, the female only
like other quadrupeds, the orifice of the
body, nor to

The ears are very large, and resemble
those of an ape. The skin of the elephant has but few hairs on
its,
and placed at great distances from each other. It is
full of wrinkles, like those on the palm of a man's
hand, besides many chapped and greasy ridges.

The female has two dugs, one on each side of the
breast.

M. Buffon supposed the ancients to have been "de-
ceived, when they tell us, that the elephants copulate
like other quadrupeds, the female only lowering her
grupper for the more easy reception of the male.

Naturalists as well as travellers agree
affirming, that the male organ of the elephant exceeds:
neither in length or diameter that of a horfe. It is,
therefore, impossible that he should attain his end in
ordinary position of quadrupeds. The female must ne-
cessarily lie on her back. De Feynes and Tavernier
positively assert, and the situation of the parts confirms
their evidence, that these animals cannot intermix in

as enables the animal to shut the canal, and to prevent
the water with which it occasionally fills the trunk
from entering into the passage of the nose where the
organs serving for the reception of smell are placed.

The elephant can move the trunk in all directions; he
can extend or shorten it at pleasure, without altering
the diameters of the two canals within. By this means
respiration is not interrupted, whatever be the situa-
tion of the trunk; and the water is allowed to remain
till the animal chooses to throw it out by an expira-
tion. Each canal is lined with a strong mucous
membrane, and the surface of the trunk is covered
with another strong mucous or skin. The sub-
stance contained between the exterior and interior
membranes is a composition of longitudinal and trans-
verse muscles, which serve to extend and contract the
length of the trunk. At the extremity of the trunk
there is a concave protuberance, in the bottom of
which are the two passages of the nostrils. The in-
ferior part of the protuberance is thicker than the sides,
and the superior part is stretched out like a finger ab-
out five inches long; which, together with the edges
of the whole extremity of the trunk, takes on dif-
tinct figures according to the necessities of the animal.

It is by this organ that the animal lays hold of food or
other substances; which he manages with as much
dexterity as a man does his hand, taking up grains of
corn, or the smallest piles of grains, and conveying
them to his mouth. When he drinks, he thrusts his
trunk into the water, and fills it by drawing in his
breath and exhausting the air: when the trunk is thus
filled with water, he can either throw it out to a great
distance, or drink it by putting the end of the trunk
in his mouth.

The two large tufts, which some call the horns
of the elephant, are of a yellowish colour, and extremely
hard. The bony substance of which they are com-
oposed is known by the name of Ivory, and much used
in different branches of manufacture.

The ears are very large, and resemble those of an
ape. The skin of the elephant has but few hairs on its,
and placed at great distances from each other. It is
full of wrinkles, like those on the palm of a man's
hand, besides many chapped and greasy ridges.

The female has two dugs, one on each side of the
breast.
any other manner. They require, therefore, more
time and convenience for this operation than other
quadrupeds: and it is perhaps for this reason that
they never copulate but when they enjoy full liberty,
and have every necessary article at their command.
The female must not only consent, but solicit the male,
by a position which she never assumes unless when she
thinks herself in perfect retirement." The fact, how-
ever, has been controverted by others. Dr Sparrman
informs us, that in order to possible to determine the
question, he let slip an opportunity of intervening on
the subject! every elephant-hunter he met with at the
Cape; who all agreed in replying that they were most
inclined to the common opinion, if they had not been
differently informed by two of their companions, Jacob
Kok and Marcus Potgieter, who had actually seen
elephants copulate. "I met (says our author) only
with the former of these hunters, who told me he had
likewise himself been of opinion that the female was
obliged to lie on her back on this occasion; till at length,
being out along with Potgieter hunting of ele-
phants, he had occasion to think otherwise. On a
certain spot they came to, they could reckon about
eight elephants, which, on account of the small size
of their trunks, they took for females, and having
one of them, which making several circles round one of
these
that they took for females (the only one perhaps in
rut) frequently, in all probability by way of careangling
her, struck her with their trunks, till at length she
threw herself down upon her knees, and keeping the
spine of her back in a stiff and extended position,
brought her hind-feet quite close to her fore-feet, or
somewhat beyond them; so that she almost as if it were
stood upon her head. In this forced posture they saw
her wait a long while together for the carelings of the
males, who, in fact, likewise endeavoured to perform
the matrimonial rites, but from jealousy hindered each
other whenever either of them began to mount. Af-
after two hours had thus elapsed, the patience of our
hunters began to tire; and the rather, because on
account of the uneven and stony nature of the ground,
and fire at these animals. I will not dissemble, that
though I have not the least occasion to doubt the
fact, as they have not been able to confirm it by the testi-
mony of any eye-witness, nor even by any instance of
this matter. But on the other hand, M. Tavernier's relation and different opinions touch-
ning the subject as if he were entirely
not impossible, (he informs us) makes a pit or hollow in the ground,
and affists his comfort to herself on her back; and in case he finds her perfectly compliant and agreeable,
very complacently helps her up again after the business
is finished (for she cannot possibly rise of herself), by
throwing his trunk round her neck: but if she at first
stood stiffly, and gave herself pride airs, he then even lets her lie, and goes about his business."

But concerning the credit due to this author, the pub-
lic seem not to be agreed. On the other hand, M. Buf-
fon, in his Supplement, has retracted his former op-
inion, upon the authority of M. Bles (secretary during
12 years to the Dutch government in Ceylon); who
describes the copulation of these animals in the fame
manner as Farmer Kok does in the extract above given
from Dr Sparrman. He (says M. Bles) that the Count de Buffon, in his excellent work,
is deceived with regard to the copulation of the
elephants, I know, that in several parts of Asia and Africa
these animals, especially during the season of love
remain almost in the most inaccessible places of the forests;
but in the island of Ceylon, where I lived 12 years, the land being everywhere inhabited, they cannot be easily
conceal themselves; and having often examined them,
I perceived that the female organ is situated nearly
under the middle of the belly, which would lead us to
think, with M. Buffon, that the males cannot enter
the females in the manner of other quadrupeds. How-
ever, there is only a slight difference of situation.
When they inclined to copulate, I perceived that the
female bowed down her head and neck, and leaned her
two fore-legs, which were also bended, upon the root
of a tree, as if she meant to prostrate herself on the
ground; and the two hind legs remained erect, which
gave the male an opportunity of embracing her as
other quadrupeds do. I can likewise affirm, that the
females go with young about nine months. Moreover,
the elephants never copulate unless when in a state of
freedom. In the season of love, the males are strongly
chained for four or five weeks, during which time
they discharge all quantities of semen, and are so fur-
ious, that their cornacks or governors cannot come
near them without danger. The approach of the rutting season is easily known; for some days before it
happens, an oily liquor flows from a small hole on each
side of the head. The domestic female on these occa-
sions sometimes makes her escape, and joins the wild
males in the woods. Some days afterward, her corn-
ack goes in quest of her, and calls her by her name
still she comes. She submits to him with complacency,
and allows herself to be conducted home, and shuts up
in the stable. It was from cases of this kind that it
was discovered that the females bring forth about the
end of nine months." — The first remark, with regard
to the mode of copulating, M. Buffon thinks unquestion-
able, since M. Marcel Bles affures us that he has
seen the elephants perform the operation. But as to the
time of gestation, which he limits to nine months, we ought to suspend our judgment, because all travellers affirm that the female elephant is believed to go with young no less than two years.

Elephants, even in a savage state, are peaceable and gentle creatures. They never use their weapons but in defence of themselves or companions. Their social dispositions are so strong, that they are seldom found alone, but march always in large troops; the oldest and most experienced lead the van; the younger, or lame ones, keep in the middle; and those of a second rate, as to age, walk in the rear. The females carry their young on their tusks, embracing them at the same time with their trunk. They seldom march in this regular order but when they reckon the journey dangerous, such as an expedition to cultivated lands, where they expect to meet with resistance. On other occasions they are less cautious; some of them falling behind or separating from the rest, but seldom so far as to be without the reach of assistance by alarming and assembling their companions. It is dangerous to offer them the least injury; for they run straight upon the offender; and although the weight of their body be great, their steps are so large, that they easily outrun the swiftest man, whom they either pierce with their tusks, or seize with their trunk, dart him in the air like a stone, and then trample him under their feet. But they never attack any person unless provoked. However, as they are extremely sensible and delicate with regard to injuries, it is always prudent to keep out of their way. Travellers who frequent these countries kindle large fires, and beat drums during the night, in order to prevent their approach. After being once attacked by men, or falling into any ambush, they are said never to forget the injury, but search for every opportunity of getting revenge. As they are endowed perhaps with a more exquisite sensation of smell than any other animal, owing to the greatest extent of their nose, they can scent a man at a very great distance, and trace him by his footsteps.

Elephants are peculiarly fond of the banks of rivers, deep valleys, and marshy grounds, especially when well shaded with trees. They delight in drawing up water into their trunks, even when they do not drink it, and amuse themselves in dashing the water around. They cannot endure cold, and are equally averse to an excess of heat; in order to avoid the scorching heat of the sun, they retire to the thickest and most shady parts of the forest. The bulk of their bodies is so enormous, that they do not choose to go into deep waters so frequently as some other quadrupeds; although the length of their trunk, which they raise straight up, and by which they respire, is a great advantage in swimming.

The ordinary food of elephants is roots, herbs, leaves, the tender branches of trees, fruits and grains: but they abhor flesh or fish. When any of them discovers a fine pasture, he immediately calls and invites his companions to come and eat with him. As they devour a large quantity of food in a short time, they are always shifting their pasture; when they meet with cultivated grounds, they make a prodigious defolation, and destroy more plants by their feet than they use for nourishment: which last is very considerable, amounting to 150 pounds of herbage every day; by this means, as they constantly graze in large troops, they lay waste whole fields in an hour. The Indians and negroes employ every art to prevent them from visiting their cultivated lands, making great noises, and burning large fires round their fields. However, these precautions are not always sufficient to prevent the elephants from visiting them. They chase away the domestic animals, put the men to flight, and sometimes even throw down their limber huts.

Elephants are hardly susceptible of fear: the only things which can sur prise them or stop their course are artificial fires, such as figs, crackers, &c. the effects of which are so sudden and so quickly repeated, that the elephants frequently turn back; and when one runs, all the rest instantly follow his example.

Although the social disposition in the elephant be exceeding strong; yet whenever the females come in season, it immediately gives place to the stronger and more interesting passion of love. They observe the greatest delicacy in their amours, abhorring nothing so much as to be seen by their companions. The troop divide themselves into couples, steal off into the most secret places in the forest, and then give way to all the impulses of nature, which are lively and lasting in proportion to the long period of abstinence; for, according to all accounts, except that of M. Blys already noticed (a), the female goes with young two years, and it is only once in three years that the season of love returns. They bring forth but one at a time; which, as soon as it comes into the world, is as large as a wild boar, and is furnished with teeth: however, the large tusks do not make their appearance till some time after, and at the age of six months they are several inches long. Elephants of this age are as large as an ox when in a natural state.

The manner of taking and taming elephants, therefore, merits our attention. In forests and such places as are frequented by elephants, the Indians choose a spot and inclose it with strong palisades, they use the largest trees as the principal stakes, to which are fixed smaller ones in a tranverse direction. These crofs trees are fixed so as to allow a man to pass easily through. There is likewise a large port left for the elephant, over which is suspended a strong barrier, which is let down as soon as he enters. In order to decoy him into the inclosure, the hunters take along with them a tame female in season, and travel about till they come so near as that the cry of the female can reach a male, whom they previously observe in the forest; then the guide of the female makes her give the cry peculiar to the season of love: the male instantly replies, and sets out in quest of her. The guide then makes the female proceed towards the artificial inclosure, repeating her cries from time to time as she goes along. She enters into

(a) Mr. Blys's information is adopted by Mr. Pennant: That they go only nine months with young, he says, is guessed by the casual escape of the tame females, when in rut, into the woods; where they couple with the wild; are soon discovered and brought back, and observed to bring forth in about nine months from that time.
into the inclosure, the male follows her, and the Indians immediately flut the port behind him. He no sooner discovers the hunters, than he is inclosed, than his passion for the sex is converted into rage and fury. The hunters entangle him with strong ropes; they fetter his legs and trunk; they bring two or three tame elephants in order to pacify and reconcile him to his condition. In a word they reduce him to obedience in a few days, by a proper application of torture and caresses. There are many other methods of catching elephants. Instead of making large inclosures with palisades, like the kings of Siam, and other monarchs, the poor Indians content themselves with a very simple apparatus; they dig deep pits in the roads frequented by elephants, covering them over with branches of trees, turf, &c. When an elephant falls into one of these pits, he is unable to get out again.

The elephant, when tamed, is the most friendly and obedient of all animals: he is entirely attached to the person who feeds and takes care of him. In a short time he understands signs, and the sound of his master's voice. He distinguishes the language of passion, of command, of satisfaction; and acts accordingly. He receives his orders with attention, and executes them with prudence and alacrity, but without precipitation. He easily learns to bow his knees and lower his body, for the convenience of those who mount on him. He caresses his friends with his trunk. He lifts burdens with his trunk, and afflicts those who are loading him in laying them on his back. He delights in shining harness and trappings. When yoked in a cart or waggon, he requires a proportional time he receives his orders with attention, and executes them with prudence and alacrity, but without precipitation. He easily learns to bow his knees and lower his body, for the convenience of those who mount on him. He caresses his friends with his trunk. He lifts burdens with his trunk, and afflicts those who are loading him in laying them on his back. He delights in shining harness and trappings. When yoked in a cart or waggon, he requires a proportional

An elephant in Adrimeer, which often paszed thrp the bazar or market, as he went by a certain herbwoman, always received from her a mouthful of greens: at length he was seized with one of his periodical fits of rage, broke his fetters, and, running through the market, put the crowd to flight; among others, this woman, who in haste forgot a little child she had brought with her. The animal recollecting the spot where his beneficreus was wont to fit, took up the infant gently in his trunk, and placed it in safety on a stall before a neighbouring house. Another, in his madness, killed his cornea or governor: the wife seeing the misfortune, took her two children and flung them before the elephant, saying, "Now you have destroyed your father, you may as well put an end to their lives and mine." It instantly stopped, relented, took the greatest of the children, placed it on its neck, adopted him for his cornea, and never afterwards would permit any body else to mount it.

A soldier at Pondicherry, who was accustomed, whenever he received the portion that came to his share, to carry a certain quantity of it to one of these animals, having one day drank rather too freely, and finding himself pursued by the guards, who were going to take him to prison, thence under the elephant's body and fell asleep. In vain did the guard try to force him from this asylum, as the elephant protected him with his trunk. The next morning the soldier, recovering from his drunken fit, floundered with horror to find himself stretched under the belly of this huge animal. The elephant, which without doubt perceived the man's embarrassment, cared for him with his trunk, in order to inspire him with courage and make him understand that he might now depart in safety.

A painter was desirous of drawing the elephant which was kept in the menagerie at Verailles in an uncommon attitude, which was that of holding his trunk raised up in the air with his mouth open. The painter, in an uncom....
the two other brethren, as if ill
Elephas. wretch writhing on the bloody tooth.

enjoyment and insult, held out to them the impaled

Great was the which

of being useful, would only tend to embarrass and

and Romans soon learnt to get the better of those

After

fire-arms are the principal

where

the combatants

them

for an enemy to approach them at that time. Another

heavy iron chain to the end of their

for an enemy to approach them at that time. Another

would certainly fall under the displeasure of the

as high as Ethiopia all the other

It abounds in the southern parts of Africa,

years, and propagate their species till they are

It is ever afterwards obliged to maintain at a greater

in anatomy, the name of several

when of late

used also in our language. Literally it signifies a disciple or scholar bred up under any one, being formed from the Italian allevare, an "apprentice" or "novice."

It was first used by the French writers in speaking of painters; such a painter was an eleve of Da Vinci, of Raphael, &c. From painting it came to be applied to such as studied or learned any other art under a master. In the Royal Academy of Sciences, there were 20 eleves: and in that of inscriptions, 50 eleves. The eleves are to act in concert with the pensionaries. See Academy.

The denomination eleve, however, has been since suppressed, and that of adjutant substituted in its room; because every body did not know the fence affixed to it by the academy; and now the pensionary academical have not, as formerly, each of them an eleve; but the
Eleusinia, in Grecian antiquity, a festival kept in honour of Ceres, every fourth year by some states, but by others every fifth. The Athenians celebrated it at Eleusis, a town of Attica; whence the name.

Ceres, says an Athenian orator (Ifocrates), wandering in quest of her daughter Proserpine, came into Attic; where four good offices were done her, which it is unlawful for those who are not initiated to hear. In return she conferred two unparalleled benefits; to wit, the knowledge of agriculture, by which the human race is raised above the brute creation; and the mysteries, from which the partakers derive sweeter hopes than other men enjoy, both as to eternity. It was the popular opinion, that the Eleusinian goddesses figgusted prudent counsel to their votaries, and influenced their hopes than other men enjoy, both as to eternity. It was the popular opinion, that the Eleusinian goddesses figgusted prudent counsel to their votaries, and influenced their hopes more than other men enjoy, both as to eternity. It was the popular opinion, that the Eleusinian goddesses figgusted prudent counsel to their votaries, and influenced their hopes than other men enjoy, both as to eternity. It was the popular opinion, that the Eleusinian goddesses figgusted prudent counsel to their votaries, and influenced their hopes than other men enjoy, both as to eternity. It was the popular opinion, that the Eleusinian goddesses figgusted prudent counsel to their votaries, and influenced their hopes than other men enjoy, both as to eternity. It was the popular opinion, that the Eleusinian goddesses figgusted prudent counsel to their votaries, and influenced their hopes than other men enjoy, both as to eternity. It was the popular opinion, that the Eleusinian goddesses figgusted prudent counsel to their votaries, and influenced their hopes than other men enjoy, both as to eternity. It was the popular opinion, that the Eleusinian goddesses figgusted prudent counsel to their votaries, and influenced their hopes than other men enjoy, both as to eternity. It was the popular opinion, that the Eleusinian goddesses figgusted prudent counsel to their votaries, and influenced their hopes than other men enjoy, both as to eternity. It was the popular opinion, that the Eleusinian goddesses figgusted prudent counsel to their votaries, and influenced their hopes than other men enjoy, both as to eternity.

The festival was divided into great and less mysteries. The less were initiated from the following circumstances. Here he paused near Eleusis while the Athenians were celebrating the mysteries, and desired to be initiated. As this could not be done, because he was a stranger, and as Eleusis was unwilling to discharge him on account of his great power, and the services which he had done to the Athenians, another festival was instituted without violating the laws. It was called μηγα, and Hercules was solemnly admitted to the celebration and initiated. These less mysteries were observed at Agræ near the Ilissus. The greater were celebrated at Eleusis, from which place Ceres has been called Eleusinia. In later times the smaller festivals were preparatory to the greater, and no person could be initiated at Eleusis without a previous purification at Agræ. This purification they performed by keeping themselves pure, chaste, and unpolluted, during nine days; after which they came and offered sacrifices and prayers, wearing garlands of flowers, called αἰοινος or αἰόνιον, and having under their feet δις κάδημον, Jupiter's skin, which was the skin of a victim offered to that god. The person who aduated was called ὑπάνων from ὑπάνων water, which was used at the purification, and they themselves were called μνηστα, the initiated.

A year after the initiation at the less mysteries they sacrificed a few to Ceres, and were admitted in the greater, and the secrets of the festivals were solemnly revealed to them, from which they were called κυβατοι and κυβατοι, inspectors.

This festival was observed in the month Boedromion or September, and continued nine days from the 13th till the 23d. During that time it was unlawful to arrest any man or present any petition, on pain of forfeiting a thousand drachmas, or according to others on pain of death. It was also unlawful for those who were initiated to sit upon the cover of a well, to eat beans, mutton, or weazels. If any woman rode to Eleusis in a chariot, she was obliged by an edict of Lycurgus to pay 6,000 drachmas. The design of this law was to destroy all distinction between the richer and poorer sort of citizens. When the feast approached, the mystæ or persons who had been initiated only in the lesser mysteries, repaired to Eleusis to be instructed in the ceremonial. The service for the opening of the temple, with morning sacrifice, was performed.
The Eleusinian mysteries, was shouting, Pluto.

The myfierious record was replaced during which the temple and of the temple and of the temple bation, of the temple and of the temple bation. They were introduced by the hierophant and daduchos, and the former showed them the mysteries. The splendor of illumination, the glory of the temple and of the images, the finging and dancing which accompanied the exhibition, all contributed to soothe the mind after its late agitation, and to render the wondering devotee tranquil and self-satisfied. After this inspection, or, as it was called, the autopfia, they retired, and others advanced. The succeeding days were employed in purification, in sacrifice, in pompous processions, and spectacles, at which they assented, wearing myrtle-crowns. The second day was called ηεια, to the feast, that are initiated; because they were commanded to purify themselves by bathing in the sea. On the third day sacrifices, and chiefly a mullet were offered; as also barley from a field of Eleusis. These oblations were called θεας, and held so sacred that the priests themselves were not, as in other sacrifices, permitted to partake of them. On the fourth day they made a solemn procession, in which the μορφόν, holy basket of Ceres was carried about in a confecrated cart, while on every side the people shouted Hail, Ceres! At night a procession was made with lighted torches, to commemorate the goddess searching for her daughter. A measure of barley, the grain which, it was believed, the bad given, was the reward of the victors in the gymnastic exercises; and the tranflation at the temple had a reference to the legend. A knowledge of these things and places, from which the profane were excluded, was the amount of initiation; and the mode of it, which had been devised by craft, was skilfully adapted to the reigning superstitions. The operation was forcible, and the effect in proportion. The priesthood flourished as piety increased. The disputation was corrupt, but its tendency not malignant. It produced sanctity of manners and an attention to the social duties; desire to be as distinguished by what was deemed virtue as by silence. Some have supposed the principal rites at this festival to have been obscene and abominable, and that from thence proceeded all the mysterious seerity. They were carried from Eleusis to Rome in the reign of Adrian, where they were observed with the same ceremonies as before, though perhaps with more freedom and licence. They lasted about 1800 years, and were at last abolished by Theodosius the Great.

ELLEUSIS, (anc. geog.) a town in Attica between Megara and the Piraeus, celebrated for the festivals of Ceres. See the preceding article. Those rites were finally extinguished in Greece upon the invasion of Alaric the Goth. Eleusis, on the overthrow of its goddes and the ceasing of its gainful traffic, probably became soon an obscure place, without character or riches. For some ages, however, it was not entirely forsaken, as is evident from the vast consumption of the ancient materials, and from the present remains, of which the following account is given by Dr Chandler. Travels in the port was small and of a circular form. The fence p. 189.
ELEUTHERIA, a festival celebrated at Plataea in honour of Jupiter Eleutherius, or “the inferior of liberty,” by delegates from almost all the cities of Greece. Its institution originated in this: after the victory obtained by the Grecians under Paunias over the Medes, the Persians general in the country of Plataea, an altar and statue were erected to Jupiter Eleutherius, who had freed the Greeks from the tyranny of the barbarians. It was further agreed upon in a general assembly, by the advice of Aristides the Athenian, that deputies should be sent every fifth year, from the different cities of Greece, to celebrate Eleutheria, festivals of liberty. The Plataeans celebrated also an anniversary festival in memory of those who had lost their lives in that famous battle. The celebration was thus: At the first day a procession went through the city, and taking a water-pot out of the city chamber, proceeded through the middle of the town, with a sword in his hand, towards the sepulchre. There he drew water from a neighbouring spring, and washed and anointed the monuments, after which he sacrificed a bull upon a pile of wood, invoking Jupiter and secret Mercury, and inviting to the entertainment the gods of the infernal region. Then he gave the festival, and all who should have offered a present in the name of the gods at their temple of Eleutheria, an half; and the basement on the head above 2 feet deep. It probably represented Proserpine. In the heap were two or three hierarchical pedestals; and on one are a couple of torches, crossed. We saw another fixed in the stone stairs, which lead up the square tower on the outside. It belonged to the statue of a lady, who was hierophant or priestess of Proserpine, and had covered the altar of the goddess with silver. A well in the village was perhaps that called Callichoros, where the women of Eleusis were accustomed to dance in honour of Ceres. A tradition prevails, that if the broken statue be removed, the fertility of the land will cease. Achmet Aga was fully satisfied with this superstitious, and declined permitting us to dig or measure there, until I had overcome his scruples by a present of a handsome muff-box containing several zechins or pieces of gold.”

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ELIAS, the prophet, memorable for having escaped the common catastrophe of mankind; being taken up alive into heaven, in a fiery chariot, about 895 B.C. See the Bible.

ELIEZER (John), a native of Sileia in the 17th century, was praetor physic at Leyden, and was remarkable for understanding 16 languages. He supported an opinion, that the German and Persian languages were derived from the same origin. His Latin translation of the Table of Cebes, with the Arabic version and the Greek, was printed at Leyden in 1640, under the care of Salmasius, who prefixed thereto a very ample preface.

ELIQUATION, in chemistry, an operation by which a more soluble substance is separated from one that is less so, by means of a heat sufficiently intense to melt the former, but not the latter. Thus an alloy of copper and lead may be separated by a heat capable of melting the latter, but not the former.

ELIAS, Elie., Elia., Elie. (ANC. nec. geog.), the capital of the district of that name in Peloponnesus, situate on the Peneus, which ran through it. It was the country of Phaedo the philosopher, scholar of Socrates, and friend of Plato; who inscribes with his name the dialogue on the immortality of the soul. Pyrrho also was of this city, at the head of the sect called after him Pyrrhonian.

The city of Elis owed its origin to an union of small towns after the Persian war. It was not encompassed immediately with a wall; for it had the care of the temple at Olympia, and its territory was solemnly consecrated to Jupiter. To invade or not protect it was deemed impious; and armies, if marching through, delivered up their weapons, which, on their quitting it, were restored. Amid warring states the city enjoyed repose, was referred to by strangers, and flourished. The region round about it was called Eurych or hollow, from the inequalities. The country was reckoned fertile, and particularly fit for the rearing of flax. This, which grew no where else in Greece, equalled the produce of Judaea in fineness, but was not so yellow. Elis was a school, as it were, for Olympia, which was distant 37 miles. The athletic exercises were performed there, before the more solemn trial, in a gymnasion, by which the Pentecos ran. The hellanodics or prefects of the temples paired the rival combatants by lot, in an area called Plistrium or The Are. Within the wall grew lofty plane-trees; and in the court, which was called the Xysus, were separate courtyards marked for the foot-races. A smaller court was called the Quadrangle. The prefects, when chosen, resided for 10 months in a building erected for their use, to be instructed in the duties of their office. They attended before sun-rise to preside at the races, and again at noon, the time appointed for the pentathlon or five sports. The horses were trained in the agora or market-place, which was called the hippodrome. In the gymnasion were altars and a cenotaph of Achilles. The women, besides other rites, beat their bosoms in honour of his hero, on a fixed day towards summer. There also was the town-hall, in which extemporary harangues were spoken and compositions recited. It was hung round with bucklers for ornaments. A way led from it to the baths through the Street of Silence; and another to the market-place, which was planted with trees between porticoes of the Doric order adorned with altars and images. Among the temples one had a circular perrylle or colonnade; but the image had been removed and the roof was fallen in the time of Pantanius. The theatre was ancient, as was also a temple of Bacchus, one of the deities principally adored at Elis. Monenvasia had a temple in the chadel, with an image of ivory and gold made (it was said) by Phidias. At the gate leading to Olympia was the monument of a person, who was buried, as an oracle had commanded, neither within nor without the city. The structures of Elis, Dr Chandler observes, seem to have been raised with materials far less elegant and durable than the produce of the Ionian and Attic quarries. The ruins are of brick, and not considerable, consisting of pieces of ordinary wall, and an octagon building with niches, which, it is supposed, was the temple with a circular peristyle. These stand detached from each other, ranging in a vale footward from the wide bed of the river Peneus; which, by the margin has several large fomes, perhaps relics of the gymnasion. The citadel was on a hill, which has on the top some remains of wall.

ELISHA the prophet, famous for the miracles he performed, died about 830 B.C. See the Bible.

ELISION,
ELISION, in grammar, the cutting off or sup­
prefling a vowel at the end of a word, for the sake of
found or measure, the next word beginning with a
vowel.

Elisions are pretty frequently met with in English
poetry, more frequently in the Latin, French,
&c. They chiefly consist in suppressions of the a, e, i,
and i, though an elision suppres{es any of the other
vowels.

ELIXATION, in pharmacy, the extracting the vir­
tu's of ingredients by boiling or stewing.

ELIXIR, in medicine, a compound tincture ex­
tracted from many efficacious ingredients. Hence the
difference between a tincture and an elixir seems to
be this, that a tincture is drawn from one ingredient,
sometimes with an addition of another to open it and
to dispose it to yield to the menstruum: whereas an
elixir a tincture extracted from several ingredients
at the same time.

ELIZABETH, queen of England, daughter of
Henry VIII. and Anna Boleyn, was born at Green­
wich, September 7th, 1533. According to the hu­
mour of the times, she was early instructed in the
learned languages, first by Grindal, who died when she
was about 17, and afterwards by the celebrated Roger
Afcham. She acquired likewise considerable know­
ledge of the Italian, Spanish, and French languages.
Dr Grindal was also her preceptor in divinity, which
she is said to have studied with uncommon applica­
tion and industry. That Elizabeth became a Protestant,
and her sister Mary a Papist, was the effect of that
cause which determines the religion of all mankind:
namely the opinion of those by whom they were edu­
cated: and this difference of opinion, in their tutors,
is not at all surprizing, when we recollect, that their
father Harry was of both religious, or of neither.

But the studies of Elizabeth were not confined
merely to languages and theology: she was also in­
structed in the political history of the ancients; and
was so well skilled in music, as to sing and play
"artfully and sweetly."

After the short reign of her brother Edward, our
heroin being then about 20 years of age, her free­
brand sister ascended to the crown, Elizabeth experi­
cenced a considerable degree of persecution, so as to be
not a little apprehensive of a violent death. She was
accused of nobody knows what; imprisoned; and, as
we are told inhumanely treated. At last, by the interce­
dion of king Philip of Spain, she was set at liberty;
which she continued to enjoy till, on the death of her
pious sister, she, on the 17th of November 1558, ac­
ceded the throne of England. Her political history
as a queen, is universally known and admired: but
her attention to the government of her kingdom did
not totally impede her pursuit of learning. Afcham,
in his Schoolmaster, tells us, that, about the year 1563,
five years after her accession, she being then at Wind­
ors, besides her perfect readiness in Latin, Italian,
French, and Spanish, she read more Greek in one day
than some prebendaries of that church did read Latin
in a whole week. (p. 21.)—She employed Sir John
Fortescue to read to her, Thucydides, Xenophon, Po­
lybius, Eutropides, Echichines, and Sophocles. (Ballard,
p. 219.)—That the Latin language was familiar to her,
is evident from her speech to the university of Oxford,
when she was near sixty: also from her spirited an­wer to
the Polish ambassador in the year 1598. And that she
was also skilled in the art of poetry appears, not only
from the several sonnets that have been preserved, but
likewise from the testimony of a contemporary writer,
Pattenham, in his Art of English Poetry (a very fearsome
book). These are his words:—"But, last in recital,
and first in degree, is the queen, whose learned, de­
licate, noble muse, easily surmounted all the rest,
for sense, sweetness, or fulness, be it in ode, elegy,
epigram, or in any other kind of poem," &c. In
this author are to be found only a specimen of 16 ver­
ses of her English poetry. "But," says Mr Walpole,
"a greater instance of her genius, and that too in
Latin, was her extempore reply to an insolent pros­
bition, delivered to her from Philip II. by his am­
assador, in this tetract:

Te veto ne pegas bello defendere Belgas:
Qua Dracon eripuit, nunc reliquitur oportet;
Qua parere currit, jubet unum locum eamque.
Religio papa fac reliquitur ad umquam.

"She instantly answered him, with as much spirit
as she used to return his invasions."

Ad Graecas, bone rex, fient mandata calendas.

Being earnestly pressed by a Roman priest, during
her persecution, to declare her opinion concerning the
real presence of Christ's body in the wafer, she an­
swered,

Christ was the word that spake it;
He took the bread and brake it;
And what that word did make it,
That I believe and take it. (Fuller's Holy State.)

She gave the characters of four knights of Notting­
hamshire in the following difficht:

* Gervaise the gentle, Stanhope the stout,
* Markham the lion, and Sutton the lout. (Welp. Cat.)

Coming into a grammar-school, she characterised
three classick authors in this hexameter:

* Pericles a crab-baff; bawdy Martial; Ovid a fine wag.
* Full Worth of Wars, 162.

Sir Walter Raleigh having wrote on a window,
Fain would I climb, yet fear I to fall;
She immediately wrote under it,
If thy heart fail thee, climb not at all. (Worth. of Demas. 36.)

"Doublife, she was a woman of singular capacity and
extraordinary acquests: and, if we could forge
the story of the Scottish Mary, and of her favou­
rice Eflë, together with the burning of a few Anabap­
tists; in short, could we forbear to contemplate her
character through the medium of religion and morali­
ty, we might pronounce her the most illustrious of
illustrious women. See further, the articles ENGLAND,
MARY, and SCOTLAND. "She died in her palace at
Richmond, the 24th of March 1602, aged 70, having
reigned 44 years; and was interred in the chapel
of Henry VII. in Westminster Abbey. Her suc­

* See (Hi. Story of)
England.
ELL

Elizabeth, English prose, when she was eleven years old. It was dedicated to queen Catharine Parr. Probably it was never printed; but the dedication and preface are preserved in the Syntagma epistolorum, in Hearne's edition of Livii Foro juliiis, p. 161. 2. Prayers and Meditations, &c. Dedicated to her father, dated at Hatfield, 1545. Manuscripts, in the royal library. 3. A Dialogue of Xenophon, in Greek, between Hiero a king, yet some time a private person, and Simonides a poet, as touching the life of the Prince and Private Man. First printed from a manuscript in her majesty's own hand-writing, in the Gentleman's Magazine for 1743. 4. Two Odes of Iophates, translated into Latin. 5. Latin oration at Cambridge. Preferred in the king's library: also in Hollinshed's Chron., p. 1206; and in Fuller's Hist. of Cambr. p. 138. 6. Latin Oration at Oxford. See Wood's Hist. and Antiq. of Oxfr. lib. 1. p. 289, also in Dr Jebb's Appendix. to his Life of Mary Queen of Scots. 7. A Comment on Plato. 8. Aestus de conuictane philosophiae, translated into English anno 1593. 9. Salust de bello Jugur- thisio, translated into English anno 1597. 10. A play of Euripides, translated into Latin, (Cat. of Royal Auth.) 11. A Prayer for the use of her fleet in the great expedition in 1596. 12. Part of Horace's Art of Poetry, translated into English anno 1598. 13. Plutarch de Carusitate, translated into English. 14. Letters on various occasions to different persons: several speeches to her parliament; and a number of other pieces.

ELIZABETH PETROWNA, (daughter of Peter the Great) the last empress of Russia, distinguished herself by her signal eloquence. She made a vow, that no person should be put to death in her reign, and the strictly observed it. The example has been followed, and confirmed by law, under the present august sovereign of Russia, Catharine II. Elizabeth died in 1762, in the 21st year of her reign and 52d of her age.

ELK, in zoology. See Cervus.

ELL, (insula) a measure, which obtains, under different denominations, in most countries, whereby cloths, fluffs, linens, filks, &c. are usually measured; answering nearly to the yard of England, the canna of Italy, the vara of Spain, the palm of Sicily, &c. Servius will have the ell to be the space contained between the two hands when stretched forth; but Suetonius makes it only the cubit.

The ells most frequently used with us are the English and Flemish; the former containing three feet nine inches, or one yard and a quarter; the latter only 27 inches, or three quarters of a yard; so that the ell English is to the Flemish ell as five to three. In Scotland, the ell contains 37¾ English inches.

M. Ricard, in his Treatise of Commerce, reduces the ells thus: 100 ells of Amsterdam are equal to 92½ of Brabant, Antwerp, and Brussells; to 93 of England; and France; to 120 of Hamburgh, Francfort, Leip- zic, and Cologne; to 125 of Breiflaw; to 110 of Bergen and Drontheim; and 117 of Stockholm.

ELLIOT, (the Right Honourable George Augus- tus, Lord Heathfield), was the youngest son of the late Sir Gilbert Elliot, Baronet; of Stubbs (a) in Roxburgh- shire; and was born about the year 1718. He received the first rudiments of his education under a private tutor; and at an early time of life was sent to the university of Leyden, where he made considerable progress in classical learning, and spoke with fluency and elegance the German and French languages. Being designed for a military life, he was sent from thence to the celebrated Ecole Royale du Génie Militaire, conducted by the great Vauban, at La Fête in Picardy; where he laid the foundation of what he so confoundingly exhibited at the defence of Gibraltar. He completed his military course on the continent by a tour, for the purpose of seeing in practice what he had studies in theory. Prussia was the most disciplined, and he continued some time as a volunteer in that service.

Mr Elliot returned in the 17th year of his age to his native country, Scotland; and was the same year, 1735, introduced by his father Sir Gilbert to Lieu- tenant-Colonel Peers of the 23rd regiment of foot, then lying in Edinburgh, as a youth anxious to bear arms for his king and country. He was accordingly entered as a volunteer in that regiment, where he continued for a year or more. From the 23rd regiment he went into the engineer corps at Woolwich, and made great progress in that study, until his uncle Colonel Elliot brought him in his adjutant of the second troop of horse grenadiers: with these troops he went upon service to Germany, and with them in a variety of actions. At the battle of Dettingen he was wounded. In this regiment he bought the rank of captain and major, and afterwards purchased the lieutenant-colo- neley from Colonel Brewerton, who succeeded to his uncle. On arriving at this rank, he resigned his com- mission as an engineer, which he had enjoyed along with his other rank, and in which service he had been actively employed very much to the advantage of his country. He received the instructions of the famous engineer Bell Tower, and made himself completely master of the science of gunnery. Had he not unfortu- nately resigned his rank in the engineer department, he would long before his death, by regular promotion, have been at the head of that corps. Soon after this he was appointed aid-de-camp to George II. and was distinguished for his military skill and discipline. In the year 1759, he quitted the second troop of horse grenadier-guards, being selected to raise, form, and discipline.

(a) The ancient and honourable family of Elliot of Stubbs, as well as the collateral branch of Elliot of Minto in the same county, and of Elliot of Port Elliot in Cornwall, are originally from Normandy. Their ancestor, Mr Elliot, came over with William the conqueror, and held a distinguished rank in his army. There is a traditionary anecdote in the family relating to an honourable distinction in their coat, which, as it corresponds with history, bears the probability of truth. When William set foot on English land, he flipped and fell on the earth. He sprung up, and exclaimed that it was a happy omen—he had embraced the country of which he was to become the lord. Upon this Alliot drew his sword, and swore by the honour of a soldier, that he would maintain, at the hazard of his blood, the right of his lord to the sovereignty of the earth which he had embraced. On the event of conquest, King William added to the arms of Alliot, which was a baton or, on a field azure, an arm and sword as a crest, with the motto, Per fames, per ignes, fertur et stelle.
discipline, the first regiment of light horse, called after him Elliot's. As soon as they were raised and formed, he was appointed to the command of the cavalry in the expedition on the coast of France, with the rank of brigadier general. After this he passed into Germany, where he was employed on the Rhine, and greatly distinguished himself in a variety of movements, where his regiment displayed a spirit of discipline, an activity and enterprize, which gained them signal honour; and indeed they have been the pattern since then of all his services, both in regard to discipline and appointment, to the many light dragoon troops that have been since raised in the service. From Germany he was recalled for the purpose of being employed as second in command in the memorable expedition against the Havannah; the circumstances of which conquest are well known.

On the peace his gallant regiment was reviewed by the king, when they presented to his majesty the standards which they had taken from the enemy. Gratified with their fine discipline and high character, the king asked General Elliot what mark of his favour he could bestow on his regiment equal to their merit? He answered, that his regiment would be proud if his majesty should think, that, by their services, they were entitled to the distinction of Royals. It was accordingly made a royal regiment, with this flattering title, "The 11th, or King's Royal Regiment of Light Dragoons." At the same time the king expressed a desire to confer some honour on the general himself; but the latter declared that the honour and satisfaction of his Majesty's approbation of his services was his chief reward.

During the peace he was not idle. His great talents in the various branches of the military art gave him ample employment. In the year 1775, he was appointed to succeed General A'Court as commander in chief of the forces in Ireland; but did not continue long in this station, not even long enough to unpack all his trunks: for finding that interferences were made by petty authority derogatory of his own, he refitted the practice with becoming spirit; and not choosing to disturb the government of the sister kingdom on a matter personal to himself, he solicited to be recalled. He accordingly was so, and appointed to the command of Gibraltar in a fortunate hour for the safety of that important fortress. The system of his life, as well as his education, peculiarly qualified him for this trust. He was perhaps the most able and active man of the age; neither indulging himself in animal food nor wine, he never slept more than four hours at a time; so that he was up later and earlier than most other men. He so inured himself to habits of hardship, that the things which are difficult and painful to other men, were to him his daily practice, and rendered pleasant by use. It could not be easy to flave such a man into a surrendai, nor possible to forfure him. The example of the commander in chief in a beleaguered garrison had a most persuasive efficacy in forming the manners of the garrison. Like him his brave followers came to regulate their lives by the most strict rules of discipline before there arose a necessity for so doing; and severe exercitie, with short diet, became habitual to them by their own choice. The military system of discipline which he introduced, and the preparations which he made for his defence, were contrived with so much judgment, and executed with so much address, that he was able with a handful of men to preserve his post against an attack, the constancy of which, even without the vigour, had been sufficient to exhaust any common set of men. Collected within himself, he in no instance destroyed, by premature attacks, the labours which would cost the enemy time, patience, and expense to complete; he deliberately observed their approaches, and seized on the proper moment, with the keenest perspicacity, in which to make his attack with success. He never spent his ammunition in useless parade or in unimportant attacks. He never relaxed from his discipline by the appearance of security, nor hazarded the lives of his garrison by wild experiments. By a cool and temperate demeanour, he maintained his station for three years of constant investment, in which all the powers of Spain were employed. All the eyes of Europe were on this garrison; and his conduct has justly exalted him to the most elevated rank in the military annals of the day. On his return to England, the gratitude of the British senate was as forward as the public voice in giving him that distinguished mark his merit deserves. Both houses of parliament voted an unanimous address of thanks to the general. The king conferred on him the honour of Knight of the Bath, with a pension during his own and a second life of his own appointment; and on June 14, 1787, his majesty advanced him to the peerage by the title of Lord Heathfield. Baron Gibraltar, permitting him to take, in addition to his family arms, the arms of the fortress he had so bravely defended, to perpetuate to futurity his noble conduct.

His lordship died on the 6th of July 1790, at his chateau at Aix-la-Chapelle, of a second stroke of the palsy, after having for some weeks preceding enjoyed tolerable good health and an unusual flow of spirits. His death happened two days before he was to have set out for Leghorn in his way to Gibraltar; of which place he was once more appointed to the defence, in the view of an approaching war. —— He married Ann, daughter of Sir Francis Drake of Devonshire; and had by her (who died in 1769) Francis Augustus, now Lord Heathfield, lieutenant-colonel of the 6th regiment of horse.

ELLIPOPACROSTYLA, in natural history, the name of a genus of crystals. The word is derived from the Greek, ἐλλυπημας imperfect, imperfe
ELOPPACRYSTYLA, in natural history, a genus of imperfect crystals, composed of 13 planes in an hexagonal column, terminated by an hexagonal pyramid at one end, and irregularly affixed to some other body at the other, with the shorter columns.

There are two species of these crystals: one short, bright, and colourless, found in great plenty in New-England and other parts of America; the other, a short, dull, and dulky brown one, found in Germany, and sometimes in England.

ELISSIA, in botany: a genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 28th order, Lutrea. The corolla is monopetalous and funnel-shaped; the berry carnous and bilocular; there are two seeds unarticulated or fet with small raised points, the one higher than the other.

ELM, in botany. See Ulmus.

ELMACINUS (George), author of the History of the Saracens, was born in Egypt, towards the middle of the 13th century. His history comes down from Mahomet to the year of the Hegira 512, anfwearing to the year of our Lord 1134; in which he sets down year by year, in a very concise manner, whatever regards the Saracen empire, intermixed with some fables relating to the eastern Christians. His abilities must have been considerable; since, though he professed Christianity, he held an office of trust near the persons of the Mahometan princes. He was son to Yafer Al Amid, secretary to the council of war under the sultans of Egypt for 45 years; and in 1238, when his father died, succeeded him in his place. His history of the Saracens was translated from Arabic into Latin by Erpinius; and printed in these two languages in folio, at Leyden, in 1625. Erpinius died before the publication; but Godfus took care of it, and added a preface. It was dedicated by Erpinius’s widow to Dr. Andrews, bishop of Winchester.

ELOCUTION. See Oratory, Part III.

ELOGY, a praise or panegyric bestowed on any person, or in consideration of its merit. The beauty of elogy consists in an expressive brevity. Eulogiums should not have so much as one epithet, properly so called, nor two words synonymous: they should strictly adhere to truth; for extravagant and improbable elogies rather lessen the character of the person or thing they would extol.

ELOHIE, Eloit, or Elohim, in scripture, one of the names of God. It is to be observed, that angels, princes, great men, judges, and even false gods, are sometimes called by this name. The sequel of the discourse is what affixes us in judging rightly concerning the true meaning of this word. It is the same as Eloha. One is the singular, the other the plural. Nevertheless Elohim is often construed in the singular number, particularly when the true God is spoken of; but when false gods are spoken of, it is construed rather in the plural.

ELOINED, in law, signifies restrained or hindered from doing something; thus it is said, that if those within age be elioned, so that they cannot live personally, their next friend shall live for them.

ELONGATION, in astronomy, the digression or reces of a planet from the sun, with respect to any planet placed on our earth. The term is chiefly used in speaking of Venus and Mercury, the arch of a great circle intercepted between either of these planets and the sun being called the elongation of that planet from the sun.

ELONGATION, in surgery, is an imperfect luxation, occasioned by the stretching or lengthening of the ligaments of any part.

ELOPEMENT, in law, is where a married woman departs from her husband, and cohabits with an adulterer; in which case the husband is not obliged to allow her any alimony out of his estate, nor is he chargeable for necessaries for her of any kind. However, the bare advertising a wife in the gazette, or other public paper, is not a legal notice to persons in general not to trust her; though a personal notice given by the husband to particular persons is said to be good.—An action lies, and large damages may be recovered, against a person for carrying away and detaining another man’s wife.

ELOQUENCE, the art of speaking well, so as to affect and persuade. See Oratory.

ELSHEIMER (Adam), a celebrated painter, born at Francon on the Main, 1574. He was first a disciple of Philip Uffenbach a German; but his desire of improvement carrying him to Rome, he soon became a most excellent artist in landscapes, history, and night pieces, with small figures. His works are but few; and the great pains he bestowed in finishing them raised their prices so high, that they are hardly any where to be found but in the cabinet of princes. He was of a melancholy turn, and sunk under the embarrassments of his circumstances in 1610. James Ernest Thomas of Landau was his disciple; and imitated his style so nicely, that their performances are not easily distinguished.

ELSINGBURG, a port-town of Sweden, in the province of Gotland, and territory of Schonen, seated on the side of the Sound, over against Elsinore. It was formerly a fortress belonging to the Danes; but all the fortifications were demolished in 1659, and there is only one tower of a castle which remains demolished. It now belongs to Sweden. E. Long. 13, 20. N. Lat. 56. 2.
ELMAS, or ELMISOES, a port-town of Denmark, feated on the Sound, in the Isle of Zealand. E. Long. 12° 23'. N. Lat. 56° 0'.—It was a small village, containing a few fishermen's huts, until 1445, when it was made a staple town by Eric of Pomerania; who conferred upon the new settlers considerable immunities, and built a castle for their defence. From that period it gradually increased in size and wealth, and is now the most considerable place in Denmark next to Copenhagen. It contains about 5000 inhabitants, amongst whom are a considerable number of foreign merchants, and the consuls of the principal nations trading to the Baltic. The passage of the Sound is guarded by the forts of Cronborg, which is situated upon the edge of a peninsular promontory, the nearest point of land from the opposite coast of Sweden. It is strongly fortified towards the shore by ditches, bastions, and regular entrenchments; and towards the sea by several batteries, mounted with 60 cannon, the largest whereof are 48 pounders. Every vessel, as it passes, lowers her top-sails, and pays a toll at Elsinore.

It is generally asserted, that this fortress guards the Sound; and that all the ships must, on account of the shoal waters and currents, steer to near the batteries as to be exposed to their fire in case of a refusal. This, however, is a mistaken notion, as no account need be made of the numerous and opposite currents in the Sound, the safest passage lies near the forts; but the water in any part is of sufficient depth for vessels to keep at a distance from the batteries, and the largest ships can even sail close to the coast of Sweden. The constant discharge, however, of the toll, is not so much owing to the strength of the forts as to a compliance with the public law of Europe. Many disputes have arisen concerning the right by which the crown of Denmark imposes such a duty. The kings of Sweden, in particular, claiming an equal title to the free passage of the Strait, were for some time exempted by treaty from paying it; but in 1720, Frederic I. agreed that all Swedish vessels should for the future be subject to the usual imposts. All vessels, beside a small duty, are rated at 1½ per cent. of their cargoes, except the English, French, Dutch, and Swedish, which pay only one per cent. and in return, the crown takes the charge of constructing light-houses, and erecting signals to mark the shoals and rocks, from the Cagett to the entrance into the Baltic. The tolls of the Sound, and of the two Belts, supply an annual revenue of above L100,000 Sterling.

ELVAS, a large town, and one of the best and most important in Portugal, seated in the province of Alentejo, a few miles from the frontiers of Estremadura in Spain. It is built on a mountain, and is strongly fortified with works of free-stone. The streets of the town are handsome, and the houses neat; and there is a cistern so large, that it will hold water enough to supply the whole town six months. The water is conveyed to it by a magnificent aqueduct, three miles in length, inflamed in some places by four or five high arches, one upon another. It was bomrdered by the French and Spaniards in 1756, but without effect. It has generally a garrison of 1000 men. The king founded an academy here, in 1733, for young gentlemen. W. Long. 7° 28'. N. Lat. 38° 39'.

ELUDING, the act of evading or rendering a thing vain and of no effect; a dexterous getting clear, or escaping out of an affair, difficulty, embarrassment, or the like. We say, to elude a proposition, &c. The design of chicanery is, to elude the force of the laws: this doctor has not resolved the difficulty, but eluded it. Alexander, says the historian, in cutting the Gordian knot, either eluded the oracle or fulfilled it: *Ille nonquiquam luctatos cum latentibus nodis, Nibil, inquit, interef, quomodo solvatur; gladiique rupitis omnibus foris, oraeus forte veni cludit, vel implicit.*

ELVELA, in botany: A genus of the natural order of fungi, belonging to the cryptogamia class of plants. The fungus is turbinate, or like an inverted cone.

ELY, in ancient chronology, the 17th month of the Jewish civil year, and the sixth of the ecclesiastical: it consisted of only 29 days, and answered pretty nearly to our August.

ELUTRIATION, in chemistry, an operation performed by washing solid substances with water, flirring them well together, and hastily pouring off the liquid, while the lighter parts remain suspended in it, that it may thereby be separated from the heavier part. By this operation metallic ores are separated from earth, stones, and other unmetallic particles adhering to them.

ELY, a city and bishop's see of Cambridgehire, situated about 12 miles north of Cambridge. E. Long. 15° 0'. N. Lat. 52° 24'. It is a county of itself, including the territory around; and has a judge who determines all causes civil and criminal within its limits. The church hath undergone various alterations since it was first established by Etheldreda, the wife of Edgar, king of Northumberland, who founded a religious house here, and planted it with virgins, and became the first abbess of it herself. The Danes entirely ruined this establishment; then Ethelwold, the 27th bishop of Winchester, rebuilt the monastery, and filled it with monks; to whom king Edgar, and many succeeding monarchs, bestowed many privileges, and great grants of land; so that this abbey became in procès of time the best of any in England. Richard, the 17th abbot, wishing to free himself of the bishop of Lincoln, within whose diocese his monastery was situated, and not liking to power a superior, he made great intercessions to King Henry I. to get Ely erected into a bishoprick; and feared neither pure nor prayers to bring this about. He even brought the bishop of Lincoln to content it, by giving him and his successeurs the manors of Bugden, Bigglewade, and Spalding, which belonged to the abbey, in lieu of his jurisdiction; but he lived not to taste the sweets of his industry and ambition, he dying before his abbet was erected into a see. His successor was the first bishop of Ely: but the great privileges the bishop enjoyed were almost wholly taken away, or much restricted, by the act of parliament, 27th Henry VIII. regarding the refounding to the crown the ancient royalties: so, instead of being palest of the isle of Ely, the bishop and his temporal steward were by that act declared to be from thenceforth justicers of the peace in the said island. This diocese contains all Cambridgeshire, and the isle of Ely, excepting Ivelham, which belongs to the see of Rochester, and 19 other parishes, that are in the diocese of Norwich; but it has a parish in Norfolk,
ELYMAIS, the capital city of the land of Elam, or the ancient Persia. We are told (1 Mac. vi. 1.) that Antiochus Epiphanes, having understood that there were very great treasures lodged in a temple at Elymais, determined to go and plunder it: but the citizens getting intelligence of his design, made an insurrection, forced him out of the city, and obliged him to fly. The author of the second book of Maccabees (ix. 2.) calls this city Persepolis, in all probability because formerly it was the capital of Persia; for it is known from other accounts, that Persepolis and Elymais were two very different cities, the latter situated upon the Eulæus, the former upon the Araxus.

ELYMUS, in botany: A genus of the digynia order, belonging to the triandria class of plants; and in the natural method ranking under the fourth order, Gramina. The calyx is lateral, bivalved, aggregate, and multiflorous.

ELYOT, Sir Thomas, a gentleman of eminent learning in the 16th century, was educated at Oxford, travelled into foreign countries, and upon his return was introduced to court. His learning recommended him to Henry VIII. who conferred the honour of knighthood on him, and employed him in several embassies; particularly in 1532, to Rome, about the divorce of Queen Catharine, and afterwards to Charles V. about 1536. He wrote, The Castle of Health, The Governor, Banquet of Sapience, Of the Education of Children, De Rebus memorabilibus Anglo, and other books; and was highly esteemed by all his learned contemporaries.

ELYSIUM, in the ancient theology, or rather mythology, a place in the inferi or lower world, furnished with fields, meads, agreeable woods, groves, shades, rivers, &c. whither the souls of good people were supposed to go after this life.

Orpheus, Hercules, and Æneas, are supposed to have descended into Elysiim in their life-time, and to have returned again; (Virg. lib. vi. ver. 638, &c.) Tibullus (lib. i. eleg. 3.) gives us fine descriptions of the Elysiim fields. Virgil opposes Elysiim to Tartarus; which was the place where the wicked underwent their punishment.

ELYSIUM, that which died for their country, to those of pure lives, to truly inspired poets, to the inventors of arts, and to all who have done good to mankind.

Some authors take the fable of Elysiim to have been borrowed from the Phœnicians; as imagining the name Elysiim formed from the Phœnician ᵅ�� alm, or ᵅ�� alm, or ᵅ�� alm, "to rejoice," or "to be in joy;" the latter a being only changed into ε, as we find done in many other names: as in EnaKims for Anaxim., &c. On which footing, Elysiim fields should signify the same thing as a place of pleasure; or

—Locis letus, & amans vireta,
Fortunatorum nemorum, sæculique beatæ.

VIRG.

Others derive the word from the Greek ὠυς ὀλυς, "I deliver, I let loose or difengage;" because here mens souls are freed or difenumered from the letters of the body. Beroaldus, and Hornius (Hist. Philosop. lib. litt. cap. 2.) take the place to have derived its name from Eliza, one of the first persons who came into Greece after the deluge, and the author and father of the Ætolians.

The Elysiim fields were, according to some, in the Fortunate Islands on the coast of Africa; in the Atlantic. Others place them in the island of Lence; and according to the authority of Virgil, they were situated in Italy. According to Lucian, they were near the moon; or in the centre of the earth, if we believe Plutarch. Olaus Wormius contends that it was in Sweden the Elysiim fields were placed.

ELZEVIRS, celebrated printers at Amsterdam and Leyden, who greatly adorned the republic of letters by many beautiful editions of the best authors of antiquity. They fell somewhat below the Stephenses in point of learning, as well as in their editions of Greek and Hebrew authors; but as to the choice of good books, they seem to have equalled, and in the neatness and elegance of their small characters, greatly to have exceeded them. Their Virgil, Terence, and Greek Testament, have been reckoned their masterpieces; and are indeed so very fine, that they justly gained them the reputation of being the best printers in Europe. There were five of these Elzevirs, namely, Lewis, Bonaventure, Abraham, Lewis, and Daniel. Lewis began to be famous at Leyden in 1595, and was remarkable for being the first who observed the distinction between the θ consonant and θ vowel, which had been recommended by Ramus and other writers long before, but never regarded. Daniel died in 1680 or 1681; and though he left children who carried on the business, paffes nevertheless for the last of his family who excelled in it. The Elzevirs have printed several catalogues of their editions; but the last, published by Daniel, is considerably enlarged, and abounds with new books. It was printed at Amsterdam, 1674, in 12mo, and divided into seven volumes.

EMANATION, the act of flowing or proceeding from some source or origin. Such is the emanation of
EMBARRASS

Emanation light from the fun; or that of effuvia from odorous, &c. bodies; of wifdom from God, &c.—The word is formed of the Latin e "out of," and matura "to flow or stream."

Emanation is also used for the thing that proceeds, as well as the act of proceeding. The power given a judge is an emanation from the regal power; the reasonable soul is an emanation from the Divinity.

Emancipation, in the Roman law, the setting free a son from the subjection of his father, so that whatever moveables he acquires belong in property to him, and not to his father, as before emancipation.

Emancipation puts the son in a capacity of managing his own affairs, and of marrying without his father's consent, though a minor. Emancipation differs from manumission, as the latter was the act of the master in favour of a slave, whereas the former was that of a father in favour of his son.

There were two kinds of emancipation: the one tacit, which was by the son's being promoted to some dignity, by his coming of age, or by his marrying, in all which cases he became his own master of course. The other, express; where the father declared before a judge, that he emancipated his son. In performing this, the father was first to tell his son imaginarily to another, whom they called pater fiduciaricus, father in trust; of whom being bought back again by the natural father, he manumitted him before the judge by a verbal declaration.

Emancipation still obtains in France, with regard to minors or pupils, who are hereby fet at liberty to manage their own effects, without the advice or direction of their parents or tutors.

EMARGINATED, among botanists. See Botany, p. 444, no. 181.

EMASCULATION, the act of castrating or depriving a male of those parts which characterize his sex. See Castration, and Eunuch.

Emaus, Emmaus, or Ammanu, (anc. geog.), a village, 60 stadia to the north-west of Jerusalem, or about seven miles: it afterwards became a town, and a Roman colony, Nicopolis, (Jerome). Reland has another Ammanu towards Lydda, 22 miles from Jerusalem. (Itinerary); a third, near Tiberias.

EMBLAMING, is the opening a dead body, taking out the intestines, and filling the place with odoriferous and defecrative drugs and spiccs, to prevent its putrifying. The Egyptians excelled all other nations in the art of preferring bodies from corruption; for fome that they embalmed upward of 2000 years ago, remain whole to this day, and are often brought into other countries as great curiosities. Their manner of embalming was thus: they scooped the brains with an iron scoop out at the nostrils, and threw in medicaments to fill up the vacancy: they also took out the entrails, and having filled the body with myrrh, caffia, and other spiccs, except frankincense, proper to dry up the humours, they pickled it in firne, where it lay foaking for 70 days. The body was then wrapped up in bandages of fine linen and gums, to make it flick like glue; and was delivered to the kindred of the deceased, entire in all its features, the very hairs of the eye-lids being preserved. They used to keep the bodies of their ancestors, thus embalmed, in little Ebarcadero, magnificently adorned, and took great pleasure in beholding them, alive as it were, without any change in their size, features, or complexion. The Egyptians also embalmed birds, &c. The prices for embalming were different; the highest was a talent, the next a qo minae, and so decreasing to a very small matter: but they who had not wherewithal to answer this expanse, contented themselves with infusing, by means of a syringe, through the fundament, a certain liquor extracted from the cedar; and leaving it there, wrapped up the body in salt of nitre: the oil thus preyed upon the integuments; so that when they took it out, the integuments came away with it, dried and not in the least purified: the body being enclosed in nitre, grew dry, and nothing remained beside the skin glued upon the bones.

The method of embalming used by the modern Egyptians, according to Maillet, is to wash the body several times with rofe-water, which he elsewhere observes, is more fragrant in that country than with us; they afterwards perfume it with incense, aloes, and a quantity of other odours, of which they are by no means sparing; and then they bury the body in a winding sheet, made partly of flilk and partly of cotton, and moistened, as is supposed, with some sweet-scented water or liquid perfume, though Maillet ufs only the term moistened; this they cover with another cloth of unmixed cotton, to which they add one of the richest suits of clothes of the deceased. The expanse, he says, on these occasions, is very great, though nothing like what the genuine embalming cost in former times.

EMBARCADERO, in commerce, a Spanish term, much used along the coasts of America, particularly those on the side of the South Sea. It signifies a place which serves some other considerable city farther within land, for a port or place of shipping, &c. of embarking or disembarking commodities. Thus Callao is the embarcadero of Lima, the capital of Peru; and Arica the embarcadero of Potosi. There are some embarcaderos 40, 50, and even 60 leagues off the city, which they serve in that capacity.

EMBARGO, in commerce, an arrest on ships or merchandise, by public authority; or a prohibition of trade, commonly on foreign ships, in time of war, to prevent their going out of port, sometimes to prevent their coming in, and sometimes both, for a limited time.

Government may lay embargoes on ships, or employ those of their subjects, in time of danger, for the service and defence of the nation: but they must not be for the private advantage of a particular trader or company; and therefore a warrant to lay a single ship is no legal embargo. No inference can be made from embargoes which are only in war-time; and are a prohibition by advice of council, and not at prosecution of parties. If goods be laden on board, and after an embargo or restraint from the prince or state comes forth, and then the master of the ship breaks ground, or endeavours to sail, if any damage accrues, he must be responsible for the same; the reason is, because his freight is due, and must be paid, even though the goods be seized as contraband.
EMBARRASS, (Embarassament), a French term, though now naturalized; denoting a difficulty or obs

tacle which perplexes or confounds a person, &c.

EMBASSASS, the office or function of an ambas

sador.

EMBAY, a port-town and city of Germany, ca

apital of a county of the same name, now in pol

leion of the king of Prussia; it is situated at the mouth of the river Ems. E. Long. 6. 45. N. Lat. 53. 50.

EMBER-weeks, are those wherein the ember or embry days fall.

In the laws of king Alfred, and those of Canute, those days are called emberne, that is, circular days, from whence the word was probably corrupted into ember-days; by the canonists they are called quattuor annorum temporum, the four cardinal feasons, on which the circle of the year turns; and hence Henchaw takes the word to have been formed, viz. by corruption from tempus or tempora.

The ember-days are, the Wednesday, Friday, and Saturday, after Quadragesima Sunday, after Whitsunday, after Holy-road day in September, and after St Lucia's day in December: which four times answer well enough to the four quarters of the year, Spring, Summer, Autumn, and Winter.

Mr Somner thinks they were originally fasts, instituted to beg God's blessing on the fruits of the earth. Agreeably to which, Skinner supposes the word ember taken from the ashes, embers, then fiowed on the head, the ember-weeks are now chiefly taken notice of, on account of the ordination of priests and deacons; because the canon appoints the Sundays next succeeding the ember-weeks, for the solemn times of ordination: Though the bishops, if they please, may ordain on any Sunday or holiday.

EMBERIZA, in ornithology, a genus of birds belonging to the order of passerines. The bill is conical, and the mandibles recede from each other towards the base; the inferior mandible has the sides narrowed inwards, but the upper one is still narrower. The most remarkable species are,

1. The nivalis, or great pyed mountain-finch of Bay, and the snowy-bird of Edwards, has white wings, but the outer edge of the prime-feathers are black; the tail is black, with three white feathers on each side. These birds are called in Scotland, snow-flakes, from their appearance in hard weather and in deep snows. They arrive in that season among the Cheviot-hills and in the Highlands in amazing flocks. A few breed in the Highlands, on the summit of the highest hills, in the same places with the ptarmigan; but the greatest numbers migrate from the extreme north. They appear in the Shetland islands; then in the Orkneys; and multitudes of them often fall, wearied with their flight, on wells in the Pentland Firth. Their appearance is a certain fore-runner of hard weather, and forms of snow, being driven by the cold from their common retreats. Their progress southward is probably thus; Spitzbergen and Greenland, Hudson's Bay, the Lapland Alps, Scandinavia, Iceland, the Ferroo Isles, Shetland, Orkneys, Scotland, and the Chivoli-hills. They visit at that season all parts of the northern hemisphire, Prussia, Austria, and Siberia. They arrive lean, and return fat. In Austria, they are caught and fed with millet, and, like the ortolan, grow excessively fat. In their flights, they keep very close to each other, mingle most confusedly together, and ding themselves collectively into the form of a ball; at which instant the fowler makes great havoc amongst them.

2. The millaris, or grey emberiza, is of a greyish colour, spotted with black in the belly, and the orbits are reddish. It is the bunting of English authors, and a bird of Europe.

3. The horulana, or ortolan, has black wings; the first three feathers on the tail are white on the edges, only the two lateral are black outwardly. The orbits of the eyes are naked and yellow; the head is greenish, and yellow towards the inferior mandible. It feeds principally upon the panic-grass; grows very fat; and is reckoned a delicate morsel by certain epicures, especially when fattened artificially. These birds are found in several parts of Europe, but are not met with in Britain; are common in France and Italy, and some parts of Germany and Sweden, migrating from one to the other in spring and autumn; and in their passage are caught in numbers, in order to fatten for the table. This species will sometimes sing very prettily, and has been kept for that purpose. The song is not unlike that of the yellow-hammer, but finer and sweeter. In some parts it makes the nest in a low hedge; in others, on the ground. It is carelessly constructed, not unlike that of the lark. The female lays four or five greyish eggs, and in general has two broods in a year.

The manner of fastening these birds for the table is as follows. They are taken and placed in a chamber lightened by lanthorns; so that, not knowing the vicissitudes of day and night, they are not agitated by the change. Are fed with oats and millet; and grow so fat, that they would certainly die if not killed in a critical minute. They are a mere lamp of fat; of a most exquisite taste, but apt soon to fatigue. These birds receive both their Greek name, and after Whit-sunday, Friday, and Ember-days, are called in Norway, ortolan, grow excessively Embriini fat. In their flights, they keep very close to each other, mingle most confusedly together, and dingle themselves collectively into the form of a ball; at which instant the fowler makes great havoc amongst them.

4. The citrinella, or yellow-hammer, has a blackish tail, only the two outward side-feathers are marked on the inner edge with a sharp white spot. It is a bird of Europe, and comes about houses in winter; it builds its nest on the ground in meadows.

5. The schoeniclas, or reed-sparrow, has a black head, a black-grey body, and a white spot on the quill feathers. It inhabits marshy places, most commonly among reeds, from which it takes its name. Its nest is worthy of notice for the artful contrivance of it, being fastened to four reeds, and suspended by them like a hammock, about three feet above the water; the cavity of the nest is deep, but narrow; and the materials are boxers, fine bents, and hairs. It lays four or five eggs of a bluish white, marked with irregular purplish veins, especially on the larger end. It is a bird much admired for its song; and, like the nightingale, it sings in the night.

6. The ortolvora, or rice-bunting, with the head and whole under side of the body black; hind part of the neck
The Greeks also give the name Emblems to inlaid or Mosaic works, and even to all kinds of ornaments of vases, moveables, garments, &c. And the Latins used emblema in the same sense. Accordingly, Cicero reproaching Verres with the statues and fine wrought works he had plundered from the Sicilians, calls the ornaments fixed thereto (and which on occasion might be separated from them) emblematum. Add, that Latin authors frequently compare the figures and ornaments of discourse to these emblematum. Thus, an ancient Latin poet portraying an orator, says, that all his words were ranged like the pieces in Nolius: *Quam inipsa cum compoferis, at different annos, Arti pavimenta, aliaque emblema virtutum.*

With us, emblemi ordinarly signifies no more than a painting, bas-relievo, or other representation, intended to hold forth some moral or political instruction.

What distinguishe an emblem from a devise is, that the words of an emblem have a full complete sense of themselves; nay, all the sense and signification which they have together with the figure. But there is a yet further difference between emblem and devise; for a devise is a symbol appropriated to some person, or that expresses something which concerns him particularly; whereas an emblem is a symbol that regards all the world alike.

These differences will be more apparent, from comparing the emblem above quoted, with the devise of a candle lighted, and the words *fumando confumor, “I waife myself in doing good.”* See DEVISE.

**EMBOLISMUS, emboliæ, in chronology, signifies “intercalation.” The word is formed of σπόλα, “to infect.”**

As the Greeks made use of the lunar year, which is only 354 days, in order to bring it to the solar, which is 365 days, they had every two or three years an embolism, i.e. they added a third lunar month every two or three years, which additional month they called embolimatum, because infected, or intercalated.

**EMBOSSING, or IMBOSSING, in architecture and sculpture, the forming or fashioning works in relieve, whether cut with a chisel or otherwise. Emboosing is a kind of sculptur, wherein the figures flick out from the plane wherein it is cut; and according as the figures are more or less prominent, they are said to be in alto, mezzo, or basso, relieve; or high, mean, or low, relief. See ENGLISHING.**

**EMBOTHRIUM, in botany: A genus of the monogyne order, belonging to the tetrandria class of plants. There is no calyx; the corolla consists of four linear oblique petals; the stamens are four very short filaments; the anther are large, oblong, and seate within the cavity of the petal. The pericarpium is a round unilocular follicle, sharpened at both ends; the seeds are four or five in number, egg-shaped, and compressed.**

**EMBRASURE, in architecture, the enlargement made of the aperture of a door or window, on the inside of the wall; its use being to give the greater play for the opening of the door or casement, or to admit the more light.**

**EMBROCATION, in surgery and pharmacy, an external kind of remedy, which consists in an irrigation of the part affected, with some proper liquor, as oils, spirits, &c. by means of a woollen or linen cloth, or a sponge, dipped in the same.**

**EMBROIDERY, a work in gold, or silver, or silk thread, wrought by the needle upon cloth, stuffs, or mullin,**
Embroidery

EMERALD, a genus of precious stones belonging to the order of the siliceous earths. The word is derived according to some, from the French emeraude, and that from the Latin smaragdus, signifying the same thing; by others it is said to be derived from the Italian smaralde, or the Arabic somorrazd. According to Cursch, the emerald is the fofet of all the precious stones, though other naturalists place it the next after the diamond in this respect. It is perhaps the most beautiful of all the gems, and, according to Wallerius, when heated in the fire, changes its colour to a deep blue, and becomes photopercient; but recovers its green colour when cold. When pulverized it has a white appearance, and, with borax, melts to a very thin and colourless glafs. It becomes electric by being rubbed, and some have the property of the tourmalin, viz. of being electrified by heat, and in that influence attracting ashes or other light substances; though the emeralds are less powerful than the tourmalin, and after having attracted the ashes, they retain them without any signs of repulsion.

Pliny mentions twelve different kinds of these precious stones; though it appears, from the want of some of them, that they must have been only certain kinds of green spar, or other green stone, which at that time went under the name of emerald among the ancients. The true emerald is found only in very small crystals, from the size 1/8 of an inch in diameter to that of a walnut. Theophrastus, however, mentions one four cubits long and three broad; likewise an oblong composed only of four emeralds, the whole length being 40 cubits, and the breadth from four to two.

Engelroom informs us, that the emeralds in their rough or native state, consist of hexagonal columns mostly truncated at both ends; and that he had some in his possession, which in a gentle heat became coloured; but in a strong heat white and opaque, without any marks of fume. Blankes, distinguishing them into two classes. 1. The pale green emerald, which comes from the east and Peru, the figure being that of a hexagonal truncated prism, and the basis a vein of white quartz. 2. The dark green emerald, which is also columnar but very dark-coloured, striped longitudinally, and has little transparency. The points are generally broken off longitudinally, though Davilla mentions one resembling a blunt triangular pyramid; and in the Imperial cabinet at Vienna, there is one with a five-sided pyramid. These are the emeralds which become electrical by heat; though all of them do not; and those which do not cannot be known but by actual experiment. The finest specimen of the former kind of emeralds is to be seen in the treasure of the holy chapel of Loreto, containing upwards of 100 of these precious stones great and small. A fellow to this was made by art, and both were presented to the king of Sicily, designed to represent two mounts Calvaries.

Emeralds are distinguished by the jewellers into two kinds, the oriental and occidental. The true oriental emerald is very scarce, and at present only found in the kingdom of Cambay. So great indeed is the scarcity of them, that an opinion prevailed that there are no oriental emeralds. This opinion is adopted, among others, by Mr Bruce; who informs us, that he made an excursion to the island of emeralds in the Red Sea, and endeavours to show that there never were any emeralds but what came from America, and that those said to have been found in the East-Indies were imported from that continent. It is probable, indeed, that in former times any kind of crytal tinged of a green colour might be called an emerald, and hence the green cochle spar brought from Egypt may have obtained the name of mother of emeralds; but of late some emeralds have been brought from Cambay into Italy which greatly excel those of America. The best emeralds of the western continent come from Peru, and are called oriental by the jewellers. Some are found in Europe, principally in the duchy of Silesia in Germany.

Rough Emeralds — Those of the first and coarsest sort, called plateuses, for grinding, are worth 27 shillings sterling the marc, or 8 ounces. The demi-morillon, 81. st. per marc. Good morillon, which are only little pieces,
Emeralds, ready cut, or polished and not cut, being of good stone, and a fine colour, are worth, 

<table>
<thead>
<tr>
<th>Weight</th>
<th>Value</th>
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| 1 carat | 10  
| 2 carats | 15  
| 3 carats | 20  
| 4 carats | 30  
| 5 carats | 40  
| 6 carats | 50  
| 7 carats | 60  
| 8 carats | 70  
| 9 carats | 80  
| 10 carats | 90  

To counterfeit EMERALDS: Take of natural crystal, four ounces; of red-lead, four ounces; verdigris, forty-eight grains; crocus martis, prepared with an empty lute matter of a fine colour, from 13 to 15 grains; put this into a crucible, leaving one inch of the crucible, and the crucible will emerge, as if by a kind of flaxen comb from the time of its being made, will fcarp in beauty an oriental emerald.

EMERSON, in physics, is the rising of any solid above the surface of a fluid specifically heavier than itself, into which it had been violently immersed or thrust.

It is one of the known laws of hydrostatics, that a lighter solid being forced down into a heavier fluid, immediately endeavours to emerge; and that with a force or moment equal to the excess of weight of a quantity of the fluid above that of an equal bulk of the solid. Thus, if a solid be immersed in a fluid of double its specific gravity, it will emerge again till half its bulk or body be above the surface of the fluid.

EMERSON, in astronomy, is when the moon, or other planet, begins to re-appear, after it has been eclipsed, or hid by the interposition of the moon, earth, or other body.

The difference of longitude is sometimes found by observing the immersions and emergences of the first of Jupiter's satellites. The immersions are observed from the time of Jupiter's king in conjunction with the sun to his opposition; and the emersions, from the opposition to the conjunction; which two intervals are usually six months a-piece, and divide the year between them. But when Jupiter is in conjunction with the sun, and 25 days before and afterwards, there is nothing to be observed; the planet, with its satellites, being then lost in the light of the sun.

EMERSON is also used when a star, before hid by the sun, is being too near him, begins to re-appear, and get out of his rays.

EMERSON (William), a late eminent mathematician, was born in June 1701, at Hurworth, a village about three miles south of Darlington; at least it is certain that he resided here from his childhood. His father Dudley Emerson was a tolerable proficient in mathematics; and without his books and instructions, perhaps his own genius (most eminently fitted for mathematical disquisitions) would have never been unfolded. He was instructed in the learned languages by a young clergyman, then curate of Hurworth, who was boarded at his father's house. In the earlier part of his life he attempted to teach a few scholars: but whether from his concise method (for he was not happy in explaining his ideas), or the warmth of his natural temper, he made no progress in his school; he therefore soon left it off; and satisfied with a moderate competence left him by his parents, he devoted himself to a studious retirement. Towards the close of the year 1781 (being sensible of his approaching dissolution), he disposed of the whole of his mathematical library to a bookseller at York; and on May 20th 1792, he died of a lingering and painful disorder at his native village, aged near 81 years.

Mr Emerson in his person was rather short, but strong and well-made, with an open countenance and ruddy complexion. He was exceedingly singular in his dress. He had but one coat, which he always wore open before, except the lower button: no waistcoat; his shirt quite the reverse of one in common use, no opening before, but buttoned close at the collar behind: a kind of flaxen wig, which had not a crooked hair in it, and probably had never been tortured with a comb from the time of its being made. He always walked up to London when he had any thing to publish, revising sheet by sheet himself.—Trufing no eyes but his own, was always a favourite maxim with him. He never advanced any mathematical proposition that he had not first tried in practice, constantly making all the different parts himself on a small scale, so that his house was filled with all kinds of mechanical instruments together or disjointed. He would frequently stand up to his middle in water while filling, a diversion he was remarkably fond of. He used to spend incoherently for some time in his leisure or relaxation take a ramble to any pot ale-house where he could get any body to drink with and talk to. The duke of Manchester was highly pleased with his company, and used oftentimes to come to him in the fields and accompany him home, but could never persuade him to get into a carriage. On these occasions he would sometimes exclaim, "Damn your whim-wham! I had rather walk." He was a married man; and his wife used to spin on an old-fashioned wheel, whereas a very accurate drawing is given in his mechanics. He was deeply skilled in the science of music, the theory of sounds, and the various scales both ancient and modern, but was a very poor performer.

The following is a list of Mr Emerson's works.

EMERY, in natural history, a rich iron-ore found in large masses of no determinate shape or size, extremely hard, and very heavy. It is usually of a dusky brownish red on the surface; but when broken, is of a fine bright iron-grey, but not without some tinge of redness; and is spangled all over with shining specks, which are small flakes of a foliaceous talc, highly impregnated with iron. It is also sometimes very red, and then usually contains veins of gold. It makes no difference with any of the acid menstruums; and is found in the island of Guernsey, in Tuscany, and many parts of Germany.

Dr. Lewis is of opinion, that some kinds of emery may contain the metal called "platinum," and on this subject has the following curious observations: Alonso Barba mentions a substance called "champi," which is a hard stone of the emery kind, participating of iron, of a grey colour shining a little, very hard to work, because it refills the fire much, found in Potosi, Chocaya, and other places, along with blackish and reddish ores that yield gold. If Platina is really found in large masses, either generally or only now and then, one might reasonably expect those masses to be such as are here described.

"Of the same kind perhaps also is the mineral mentioned by several authors under the name of Spanish emery, "famiris Hispanica," which should seem from the accounts given of it, to be no other than platina or its matrix. The "famiris" is said to be found in the gold mines, and its exportation prohibited; to contain films or veins of native gold; to be in great request among the alchemists; to have been sometimes used for the adulteration of gold; to find, equally with the noble metal, cupellation, quartation, antimony, and the regal cement; and to be separable from it by amalgamation with mercury, which throws out the "famiris" and retains the gold; properties strongly characteristic of platina, and which do not belong to any known substance besides. This defacement of gold per extradium "famiris dis Hispanicae" is mentioned by Becher in his "Minera arearia," and several times hinted at in his "Physica subterranea." Both Becher and Stahl indeed call the substance which the gold receives from the emery an earth, whereas platina is undoubtedly a metal; but this does not at all invalidate our supposition, for they give the name of earth also to the substance which copper receives from calamine in being made into brass, which is now known to be metallic.

"From these observations I have been led to suppose that the European emeries likewise might possibly participate of platina. If this was certain, it would account satisfactorily for the use which some of the alchemists are said to have made of emeries and other ferruginous ores; and we should no longer doubt, or wonder, that by treating gold with these kinds of minerals, they obtained a permanent augmentation; that this augmentation, though it refiled lead, antimony, aquafortis, and the regal cement, was separable, as Becher owns it was, by quicksilver; and that, when it exceeded certain limits, it rendered the gold pale and brittle against the objections that have been made to several parts of his works. 16. A Miscellaneous Treatise, containing several mathematical subjects, 8vo. 1776.

"If emery contains platina, I imagined it might be disoverable by boiling the powdered mineral in melted lead, and afterwards working off the lead upon a test or cupel. The experiment was made with eight ounces of the finest powder of common emery, and the same quantity of lead; which were covered with black flux to prevent the foerification of the lead, and urged with a strong fire for two or three hours. The lead became hard, rigid, of a dark colour, and a granulated texture, as if it had really imbibed some platina from the emery; but in cupellation it worked almost entirely off, leaving only a bead about the size of a small pin's head, which was probably no other than silver contained in the lead.

"I repeated the experiment with some variation, thinking to obtain a more perfect resolution of the emery by vitrifying it with lead. Two ounces of fine emery and six ounces of minium were well mixed together, and urged with a strong fire, in a close crucible, for an hour: they melted into an uniform dark brownish glass. The glass was powdered, mixed with four ounces of fixt alkaline salt and some powdered charcoal, and put into a fresh crucible, with some common salt on the surface: The fire was pretty strongly excited; but the fusion was not so perfect as could be wished, and only about two ounces of lead were found revived. This lead had suffered nearly the same change as that in the foregoing experiment; and, like it, gave no appearance of platina on being cupelled.

"It seems to follow from these experiments, that the emery employed in them contained no platina; but as it is not to be supposed that all emeries are of one composition, other sorts may deserve to be submitted to the same trials. As gold is contained in some parcels of common minerals, and by no means in all the individuals of any one species; platina may possibly in like manner be found in some European ores, though there is not the least footstep of it in other parcels of the same kind of ore.

EMETICS, medicines that induce vomiting. EMMIS, ancient inhabitants of the land of Canaan beyond Jordan, who were defeated by Chederaamon and his allies, Gen. xiv. 5. Moses tells us, that they were beaten in Shame Kirjathaim, which was in the country of Sion conquered from the Moabites, Joth. xiii. 19—21. The Emims were a warlike people, of a gigantic stature, great and many, and tall as the Anakims.

EMINENCE, in geography, a little hillock or affluent above the level of the adjoiningampaign.

EMINENCE is also a title of honour given to cardinals. The decree of the pope, whereby it was appointed that the cardinals should be addressed under the quality of eminence, bears date the 10th of January 1630. They then laid aside the titles of illestrissimi, reverendissimi, which they had borne before.

The grand master of Malta is likewise addressed under the quality of eminence. The popes John VIII. and Gregory VII. gave the same titles to the kings of France. The emperors have likewise borne it.
EMM

EMMINENTISSIMUS, the superlative of eminent, has of late been attributed to the cardinals.

EMIR, a title of dignity among the Turks, signifying a prince.

This title was first given to the caliphs; but when they assumed the title of Sultans, that of emir remained to their children; as that of Caesar among the Romans. At length the title came to be attributed to all who were judged to descend from Mahomet by his daughter Fatimah, and who wore the green turban instead of the white. The Turks make an observation, that the emirs, before their fortieth year, are men of the greatest gravity, learning, and wisdom; but after this, if they are not great fools, they discover some signs of levity and frivolity. This is interpreted by the Turks a sort of divine impulse in token of this, if they are not greatest, they discover some tendency to the ejaculation of semen or seed in the year after, he was made rector of that college: which employment he filled with the greatest eminence, and in the circle of his lectures, till his infirmities prevented his public appearance. His wisdom was equal to his learning; so that the governor of Friesland and Groningen often consulted him, and seldom failed to follow his advice. He wrote Vetus Graeca illustrata, 3 vols; Deutec Rerum Frescardam; and many other valuable works. He died in 1625.

EMMENAGOGUES, in medicine, such remedies as promote the menstrual discharge. They are thus called from a certain report, or tradition, that the patient, or other instrument, whereby a period is preferred to an office, gives him a right to enjoy all the due, honours, profits, and emoluments belonging thereto.—emolument is also used, in a somewhat greater latitude, for profit or advantage in the general.

EMOLUMENT, is properly applied to the profits arising daily from an office or employ. The word is formed of the Latin emolumentum, which according to some, primarily signifies the profits resounding to the miller from his mill, of molendo molentes, to grind. The patient, or other instrument, whereby a period is preferred to an office, gives him a right to enjoy all the due, honours, profits, and emoluments belonging thereto.—emolument is also used, in a somewhat greater latitude, for profit or advantage in the general.

EMOTION and Passion, in the human mind, are thus distinguished by a celebrated writer*. An internal motion or agitation in the mind, when it paffeth away without desire, is denominated an emotion; when desire follows, the motion or agitation is denominated a passion. A fine face, for example, raieth in me a pleasant feeling; if that feeling vanieth without producing any effect, it is in proper language an emotion; but if the feeling, by reiterated views of the object, becomes sufficiently strong to occasion desire, it loses its name of emotion, and acquires that of passion. The same holds in all the other passions. The painful feeling raised in a spectator by a flight injury done to a stranger, being accompanied with no desire of revenge, is termed an emotion; but that injury raieth in the stranger a stronger emotion, which being accompanied with desire of revenge, is a passion. External exprefions of distress produce in the spectator a painful feeling, which being sometimes to flight as to pass away without any effect, is an emotion; but if the feeling be so strong as to prompt desire of affording relief, it is a passion, and is termed pity. Envy is emulation in excess; if the exaltation of a competitor be barely disagreeable, the painful feeling is an emotion; if it produce desire to deprech him, it is a passion. See Passion.

EMOUY, or HIA-t-rench, an island and port of China, under the jurisdiction of the province of Fo-ken.

The port is properly an anchoring-place for ships, inclosed on one side by the island from which it takes its name, and on the other by the main land; but it is so extensive, that it can contain several thousands of vessels; and the depth of its water is so great, that the largest ships may lie close to the shore without danger.

In the beginning of the present century it was much frequented by European vessels; but few visit it at present, as all the trade is carried on at Canton. The emperor keeps here a garrison of 6 or 7000 men, commanded by a Chinofe general. In entering this road,
The god Pouff is placed on the middle of this altar, on a flower of gilt brafs, which serves as a base, and holds a young child in his arms; several idols, which are no doubt tabularian deities, are ranged around him, and bow by their attitudes their respect and veneration.

The bonzes have traced out on the walls of this temple several hieroglyphical characters in praise of Pouff; there is also to be seen an historical or allegorical painting in fresco, which represents a burning lake, in which several women appear to be swimming, some carried by monsters, others surrounded by dragons and winged serpents. In the middle of the gulph rives a steep rock, on the top of which the god is seated, holding in his arms a child, who seems to call out to those who are in the flames of the lake; but an old man, with hanging ears and horns on his head, prevents them from climbing to the summit of the rock, and threatens to drive them back with a large club. The bonzes are at a loss what answer to give, when any questions are asked them concerning this painting. Behind the altar is a kind of library, containing books which treat of the worship of idols.

On descending from this dome you cross the court, and enter a kind of gallery, the walls of which are lined with boards; it contains 24 statues of gilt brafs, representing the name of philosophers, ancient disciples of Confucius. At the end of this gallery you find a large hall, which is the refedtory of the bonzes; and after having traversed a spacious apartment, you at length enter the temple of Pouff, to which there is an ascent by a large stone stair-case. It is ornamented with vases full of artificial flowers (a work in which the Chinese excel); and here also are found the same kind of musical instruments as those mentioned before. The statue of the god is not to be seen but through a piece of black gauze, which forms a kind of veil or curtain before the altar. The rest of the pagod consists of several large chambers, exceedingly neat, but badly dispoled; the gardens and pleasure grounds are on the declivity of the mountain; and a number of delightful grottos are cut out in the rock, which afford an agreeable shelter from the excessive heat of the sun.

There are several other pagods in the isle of Emouy; among which is one called The Pagod of the Ten Thousands Stones, because it is built on the brow of a mountain where there is a like number of little rocks, under which the bonzes have formed grottos and very pleasant covered seats. A certain rural simplicity reigns here, which captivates and delights.

Strangers are received by these bonzes with great politeness, and may freely enter their temples; but they must not attempt to gratify their curiosity fully, nor to enter those apartments into which they are not introduced, especially if they are accompanied by proslious persons; for the bonzes, who are forbid under pain of severe punishment to have any intercourse with women, and who often keep them in private, might, from fear of being discovered, revenge themselves for too imperious a curiosity.

EMPALEMENT, an ancient kind of punishment, which consisted in thrusting a stake up through the fundament. The word comes from the French empaler, or the Italian impalare; or rather, they are all alike derived from...
In the East, the title and quality of emperor are more frequent than in Europe; thus, the foreign princes of China, Japan, Mogul, Persia, &c., are all emperors of China, Japan, &c. In the year 1723, the czar of Muscovy assumed the title of \textit{emperor of all Russia}, and procured himself to be recognized as such by most of the princes and states of Europe.

In the West, the title has been a long time restrained to the emperors of Germany. The first who bore it was Charlemagne, who had the title of emperor conferred on him by Pope Leo III., though he had all the power before. The imperial prerogatives were formerly much more extensive than they are at present. 

At the clofe of the Saxon race, A.D. 1024, they exercised the right of conferring all the ecclesiastical benefices in Germany; of receiving the revenues of them during a vacancy; of succeeding to the effects of intestate ecclesiastics; of confirmin and annulling the elections of the popes; of assembling councils, and of appointing them to decide concerning the affairs of the church; of conferring the title of king on their valets; of granting vacant fiefs; of receiving the revenues of the empire; of governing Italy as its proper sovereign; of erecting free cities, and establishing fairs in them; of assembling the diets of the empire, and fixing the time of their duration; of coining money, and conferring the same privilege on the states of the empire; and of administering both high and low justice within the territories of the different states; but in the year 1437, they were reduced to the right of conferring all dignities and titles, except the privilege of being a state of the empire; of the paramount, or of appointing once during their reign a dignity in each chapter or religious house; of granting dispensations with respect to the age of majority; of erecting cities, and conferring the privilege of coining money; of calling the meetings of the diet, and presiding in them.

To which some have added, 1. That all the princes and states of Germany are obliged to do them homage, and swear fidelity to them. 2. That they, or their generals, have a right to command the forces of all the princes of the empire, when united together. 3. That they receive a kind of tribute from all the princes and states of the empire, for carrying on a war which concerns the whole empire, which is called the Roman mouth. For the rest, there is not a foot of land or territory annexed to his title; but ever since the reign of Charles IV., the emperors have depended entirely on their hereditary dominions as the only source of their power, and even of their subsistence. See Diet and Electors.

The kings of France were anciently also called emperors, at the time when they reigned with their sons, whom they associated to the crown. Thus Hugh Capet, having associated his son Robert, took the title of emperor, and Robert that of king; under which titles they are mentioned in the History of the Council of Rheims, by Gerbert, &c. King Robert is also called emperor of the French by Helgan of Fleury. Louis le Gros, upon associating his son, did the same. In the First Register of the King's Charters, fol. 166, are found letters of Louis le Gros, dated in 1176, in favour of Raymond bishop of Magnesie, wherein he styles himself, \textit{Ludovicus, Dei ordinarice providentia,}
Frumentius imperator Augustus. The kings of England had likewise anciently the title of emperors, as appears from a charter of king Edgar: Ego Edardus Anglorum REX, omnium regum infidelum occasi qui Britanniam circumjact, &c. imperator & dominus.

EMPITREUM, BERRY-BEARING HEATH: A genus of the triandra order, belonging to the monœcæ class of plants. In the natural method this genus is ranked by Linnaeus under the 54th order, Mistanæae; and likewise among those of which the order is doubtful. The male calyx is tripartite; the corolla tripetalous; the stigmas long; the female calyx is tripartite; the corolla tripetalous; the styles nine; the berry nine-seeded. There are two species; one of which, viz. the nigrum, which bears the crow-cake berries, is a native of Britain. It grows wild on boggy heaths and mountains. Children sometimes eat the berries; but, when taken in too great quantity, they are apt to occasion a head-ache. Goose feed upon them. When boiled with alum, they afford a dark purple dye. Goats are not fond of it. Cows, sheep, and horses refuse it.

EMPHASIS, in rhetoric, a particular stress of the voice and action, laid on such parts or words of the oration as the orator wants to inforce upon his audience. See DECLAMATION. ORATORY, PART IV.; and READING.

EMPHYSEMA, in surgery, a windy tumor, generally occasioned by a fracture of the ribs, and formed by the air inflating itself, by a small wound, between the skin and muscles, into the substance of the cellular or adipose membrane, spreading itself afterwards up to the neck, head, belly, and other parts, much after the manner in which butchers blow up their veal.

EMPIRE (imperium), in political geography, a large extent of land, under the jurisdiction or government of an emperor. See EMPEROR.

In ancient history we read of four great monarchies or empires, viz. that of the Babylonians, Chaldeans, and Assyrians; that of the Medes and Persians; that of the Greeks; and that of the Romans. The first subsisted from the time of Nimrod, who founded it in the year of the world 1800, according to the computation of Ussher, to Sarsapanus their last king in 3257; and consequently lasted above 1450 years. The empire of the Medes commenced under Arbace, in the year of the world 3257, and was united to that of the Babylonians and Persians under Cyrus, in 3466, and it closed with the death of Darius Codomannus in 3674.

The Grecian empire lasted only during the reign of Alexander the Great, beginning in the year of the world 3674, and terminating with the death of this conqueror in 3687; his conquests being divided among his captains. The Roman empire commenced with Julius Cæsar, when he was made perpetual dictator, in the year of the city 708, and of the world 3956, 48 years before Christ. The feat of the empire was removed to Byzantium by Constantine, in the year of our Lord 334; the east and west were then united under the title of the Roman empire, till the Romans proclaimed Charlemagne emperor, A.D. 800. From this epocha the east and west formed two separate empires; that of the east, governed by Greek emperors, commenced A.D. 802; and being gradually weakened, terminated under Constantine Palæologus in 1453. The western empire was afterwards known by the appellation of the empire, or German empire.

Antiquaries distinguish between the medals of the upper, and lower or bar, empire. The only curious only value those of the upper empire, which commences with Cæsar or Augustus, and ends in the year of Christ 260. The lower empire comprehends near 1200 years reckoning down to the destruction of Constantinople in 1453. They usually distinguish two ages, or periods, of the lower empire: the first beginning where the upper ends, viz. with Aurelian, and ending with Anastasius, including 200 years; the second beginning with Anastasius, and ending with the Palæologi, which includes 1000 years.

EMPIRE, OE THE EMPIRE, used absolutely and without any addition, signifies the empire of Germany; called also, in juridical acts and laws, The holy Roman empire. It had its beginning with the tenth century; Charlemagne being created first emperor by Pope Leo III. who put the crown on his head in St. Peter’s church on Christmas-day in the year 800.

Authors are at a loss under what form of government to range the empire. Some of them maintain it to be a monarchical state, because all the members thereof are obliged to acknowledge the will of the emperor, and to take an oath of fidelity to him. Others consider it as a republic, or aristocratic state, because the emperor cannot resolve or determine anything without the concurring suffrages of the princes. It is added, that if they require investiture from, and swear fealty to him, it is only as head of the republic, and in the name of the republic, and not in his own; just as at Venice every thing is transacted in the name of the doge. Others will have the empire to be a monarchic-aristocratic state, i.e. a mixture of monarchy and aristocracy; because, though the emperor in many cases seems to act sovereignly, yet his decrees and resolves have no force, in case the state refuse to confirm them. Lastly, it has been called an aristocratical state, because the diet, wherein the sovereignty is lodged, is composed of princes and the deputies of the cities; and is divided into three orders or bodies, called colleges, viz. the college of electors, the college of princes, and the college of cities.

We say, diet of the empire, circles of the empire, siefs of the empire, princes of the empire, cities of the empire, members of the empire, capitulations of the empire. See DIET, CIRCLE, PRINCE, CAPITULATION, &c.

The states or cities of the empire are of two kinds, mediate and immediate. The immediate states are those who hold immediately of the empire: Whereof, again, there are two kinds: the first, such as have seats and voices in the imperial diet; the second, such as have none. The mediate states are those who hold of the immediate.

The states which now compose the empire are: The princes of the empire, the counts of the empire, the free barons of the empire, the pretors of the empire, the princeses or abbesses of the empire, the nobles of the empire, and the imperial cities.

EMPIRIC, an appellation given to those physicians who conduct themselves wholly by their own experience, without studying physic in a regular way.
EMPIS, in zoology, a genus of insects belonging to the order Diperera; of which the characters are these: The proboscis is of a horn-like substance, bivalved, reflected under the head and breast, and longer than the thorax. See a specimen on Plate CLXXXII.

EMPLASTER. See PLASTER.

EMPORIÆ, a double city of the Hither Spain, near the Pyrenees; separated by a wall: one part occupied by the Greeks of Phocaea, whence originally are the Mallorcians; the other, by native Spaniards, to whom it was added by Alexander a Roman colony. Now Ampurias, in Catalonia. E. Long. 2. 50. N. Lat. 42. 15.

EMPLACEMENT, in medicine, is often used for the common fenory in the brain. See BRAIN.

EMPEROR. See EMPORIUM.

EMTZEM, in medicine, a disorder wherein purulent matter is contained in the thorax or breast, after an inflammation and suppuration of the lungs and pleura. See MEDICINE-INDEX.

EMPFREHAI, air. So Dr Higgins denominates that which Dr Priestley calls deplogified air, and other philosophers vitai or pure air.

EMPHYSEMA, a term used by divines for the highest heaven, where the blessed enjoy the the beatific vision. The word is formed of Εµµυος, and πνευμα, because of its splendor.

EMPHYSEMA, in chemistry, signifies a very disagreeable smell produced from burnt oils. It is often perceived in distillations of animal as well as vegetable substances, when they are exposed to a quick fire.

EMRODS. See HEMOREHRODS.

EMULSION, a foit liquid remedy, of a colour and consistence resembling milk. See PHARMACY.

EMUNCTORY, in anatomy, a general term for all those parts which serve to carry off the excrementitious parts of the blood and other humours of the body. Such more especially are the kidneys, bladder, and most of the glands.

EMULATION, in grammar, is when one word is substituted for another of the same part of speech: A substantival for an adjective; as exercitus victoris, for victorius; foetus, for fetus; A primitive for a derivative; as Dardana armæ, for Dardania: An active for a passive; as: aux humidae causae præcipitati, for precipitatur, &c.

ENAMEL, in general, is a vitrified matter between the parts of which is dispersed some unvitrified matter: hence enamel ought to have all the properties of glass except transparency.

Enamels have for their basis a pure crystal glass or frit, ground up with a fine calx of lead and tin prepared for the purpose, with the addition usually of white salt of tartar. These ingredients baked together are the matter of all enamels, which are made by adding colours of this or that kind in powder to this matter, and melting or incorporating them together in a furnace.

For white enamel, Neri (De Arte Vitriar) directs only manganese to be added to the matter which constitutes the basis. For azure, zaffer mixed with calx of brafs. For green, calx of brafs with scales of iron, or with coccus martius. For black, zaffer with manganese or with coccus martius; or manganese with tartar. For red, manganese, or calx of copper and red tartar. For purple, manganese with calx of brafs. For yellow, tartar and manganese. And for violet-coloured enamel, manganese with thirc-calciend brafs.

In making these enamels, the following general cautions are necessary to be observed. 1. That the pots must be glazed with white glafs, and must be such as will bear the fire. 2. That the matter of enamels must be very nicely mixed with the colours. 3. When the enamel is good, and the colour well incorporated, it must be taken from the fire with a pair of tongs. 4. The general way of making the coloured enamel is this: Powder, sift, and grind, all the colours very nicely, and first mix them with one another, and then with the common matter of enamels; then let them in pots in a furnace; and when they are well mixed and incorporated, cut them into water; and when dry, set them in a furnace again to melt; and when melted, take a proof of it. If too deep coloured, add more of the common matter of enamels; and if too pale, add more of the colours.

Enamels are used either in counterfeiting or imitating precious stones, in painting in enamel; or by enamellers, jewellers, and goldsmiths, in gold, silver, and other metals. The two first kinds are usually prepared by the workmen themselves, who are employed in these arts. That used by jewellers, &c. is brought to us chiefly from Venice or Holland, in little cakes of different sizes, commonly about four inches diameter, having the mark of the maker struck upon it with a punchone. In Britain it pays 15. 7. 4. d. the pound on importation.
ENAMELLING, the art of laying enamel upon metals, as gold, silver, copper, &c. of melting it at the fire, or of making divers curious works in it at a lamp. It signifies also to paint in enamel.

The method of painting in Enamel. This is performed on plates of gold or silver, and most commonly of copper, enamelled with the white enamel; whereon they paint with colours which are melted in the fire, where they take a brightness and luire like that of grass. This painting is the most prized of all for its peculiar brightness and vivacity, which is very permanent, the force of its colours not being effaced or dimmed with time as in other painting, and continuing always as fresh as when it came out of the workmen's hands. It is useful in miniature: It being more difficult the larger it is, by reason of certain accidents it is liable to in the operation. Enamelling should only be practised on plates of gold, the other metals being less pure: copper, for instance, scales with the application, and yields fumes; and silver turns the yellow white. Nor must the plate be made flat; for in such a case, the enamel cracks: to avoid which, they usually forge them a little round or oval, and not too thick.

The plate being well and evenly forged, they usually begin the operation by laying on a coat of white enamel (as we observed above) on both sides, which prevents the metal from swelling and blistering; and this first layer serves for the ground of all the other colours. The plate being thus prepared, they begin at first by drawing out exactly the subject to be painted with red vitriol, mixed with the oil of spike, marking all parts of the design very lightly with a small pencil. After this, the colours (which are to be before ground with water in a mortar of agate, extremely fine, and mixed with oil of spike somewhat thick) are to be laid on, observing the mixtures and colours that agree to the different parts of the subject; for which it is necessary to understand painting in miniature. But here the workman must be very cautious of the good or bad qualities of the oil of spike he employs to mix his colours with, for it is very subject to adulterations.

Great care must likewise be taken, that the least dust imaginable come not into your colours while you are either painting or grinding them; for the least speck, when it is worked up with it, and when the work comes to be put into the reverberatory to be red hot, will leave a hole, and so defeat the work.

When the colours are all laid, the painting must be gently dried over a slow fire to evaporate the oil, and the colours afterwards melted to incorporate them with the enamel, making the plate red-hot in a fire like what the enamellers use. Afterwards that part of the painting must be puffed over again which the fire hath any thing effaced, strengthening the shades and colours, and committing it again to the fire, observing the same method as before, which is to be repeated till the work be finished.

Method of Enamelling by the Lamp. Most enamelled works are wrought at the fire of a lamp, in which, instead of oil, they put melted horse-grease, which they call caballine oil. The lamp, which is of copper, or white iron, consists of two pieces; in one of which is a kind of oval plate, six inches long, and two high, in which they put the oil and the cotton. The other part, called the box, in which the lamp is inclosed, serves only to receive the oil which boils over by the force of the fire. This lamp, or, where several artificers work together, two or three more lamps are placed on a table of proper height. Under the table, about the middle of its height, is a double pair of organ-beggles, which one of the workmen moves up and down with his foot to quicken the flame of the lamps, which are by this means excited to an incredible degree of vehemence. Grooves made with a gauge in the upper part of the table, and covered with parchment, convey the wind of the bellows to a pipe of glass before each lamp; and that the enamellers may not be incommoded with the heat of the lamp, every pipe is covered at six inches distance with a little tin plate, fixed into the table by a wooden handle. When the works do not require a long blast, they only use a glass-pipe, into which they blow with their mouth.

It is incredible to what a degree of fineness and delicacy the threads of enamel may be drawn at the lamp. Thofe which are used in making false tufts of feathers are so fine, that they may be wound on the reel like silk or thread. The fictitious jets of all colours, used in embroideries, are also made of enamel; and that with so much art, that every small piece hath its hole to pass the thread through wherewith it is fused. These holes are made by blowing them into long pieces; which they afterwards cut with a proper tool.

It is seldom that the Venetian or Dutch enamels are used alone; they commonly melt them in an iron-ladle, with an equal part of glass or crystal; and when the two matters are in perfect fusion, they draw it out into threads of different sizes, according to the nature of the work. They take it out of the ladle while liquid, with two pieces of broken tobacco-pipes, which they extend from each other arm's length. If the thread is required still longer, then another workman holds one end, and continues to draw it out, while the first holds the enamel to the flame. Thofe threads, when cold, are cut into what lengths the workman thinks fit, but commonly from 10 to 12 inches; and as they are all round, if they are required to be flat, they must be drawn through a pair of pinchers while yet hot. They have also another iron instrument in form of pinchers, to draw out the enamel by the lamp when it is to be worked and disposed in figures. Lastly, they have glass-tubes of various sizes, serving to blow the enamel into various figures, and preserve the necessary vacancies therein; as also to spare the fluid, and form the contours. When the enameller is at work, he fits the lamp with his foot on the step that moves on the bellows; and holding in his left hand the work to be enamelled, or the brass or iron-wires the figures are to be formed on, he directs with his right the enamel thread, which he holds to the flame with a management and patience equally surprizing. There are few things they cannot make or represent with enamel; and some figures are as well finished, as if done by the most skilful carvers.

ENARTHROSIS, in anatomy, a species of DIARTHROSI.

ENCÆNIA, the name of three several feasts celebrated by the Jews in memory of the dedication, or
Encampment, the pitching of a camp.

Encaustic, in surgery, a tubercle arising either from the caruncula lachrymalis, or from the lacrimal puncta, and gradually presented from the caruncula lachrymalis, or from the caruncula lachrymalis, or from the lacrimal puncta, and gradually presented from the caruncula lachrymalis, or from the lacrimal puncta, and gradually presented from the caruncula lachrymalis, or from the lacrimal puncta.

Mr. Muntz has also discovered a method of forming grounds for painting with crayons, and fixing these, as well as water colours, employed with the pencil. On the unwaxed side of a linen cloth, firstmented and waxed as before, lay an even and thick coat of the colour proper for the ground; having prepared this colour by mixing some proper pigment with an equal quantity of chalk, and tempering them with water. When the colour is dry, bring the picture to the fire that the wax may melt, pass through the cloth, and fix the colours. This method, however, can only be applied to cloth or paper, through the substance of which the wax may pass, but in wood, stone, metals, or plaster, the former method of Count Caylus must be observed.

Mr. Muntz, in a treatise on this subject, has proposed several improvements in the art of encaustic painting. When the painting is on cloth, he directs it to be prepared by stretching it on a frame, and rubbing one side several times over with a piece of beeswax or virgin wax, till it is covered with a coat of wax of considerable thickness. In fine linen, this is the only operation necessary previous to painting; but coarse cloth must be rubbed gently on the unwaxed side with a pumice stone, to take all those knots which would prevent the free and accurate working of the pencil. Then the subject is to be painted on the unwaxed side with colours prepared and tempered with water; and when the picture is finished, it must be brought near the fire, that the wax may melt and fix the colours. This method, however, can only be applied to cloth or paper, through the substance of which the wax may pass, but in wood, stone, metals, or plaster, the former method of Count Caylus must be observed.

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The encaustic painting has many peculiar advantages: though the colours have not the natural varnish or shining which they acquire with oil, they have all the strength of paintings in oil, and all the airiness of water-colours, without partaking of the apparent character or defects of either; they may be looked at in any light and in any situation, without any false glare: the colours are firm, and will bear washing; and a picture, after having been smoked, and then exposed to the dew, becomes as clean as if it had been just painted. It may also be re touched at pleasure without any detriment to the colours; for the new colours will unite with the old ones, without spots, as is the case in common size painting; nor is it necessary to rub the places to be retouched with oil as in oil pictures; it is not liable to crack, and easily repaired, if it should chance to suffer any injury. The duration of this painting is also a very material advantage; the colours are not liable to fade and change; no damp can affect them, nor any corrosive sub stance injure them; nor can the colour fall off in shivers from the canvas. However, notwithstanding all these and other advantages enumerated by the abbe Mazaeus and Mr Muntz, this art has not yet been much practised. Many of these properties belong to a much higher species of encaustic painting afterwards discovered in England, the colours of which are fixed by a very intense heat; nor are the colours or grounds on which they are laid liable to be dissolved or corrupted by any chemical menstruum, nor like the glazy colours of enamel, to run out of the drawing on the fire. What this method consists in will appear from the following account communicated in a letter from Mr Josiah Colebrooke to the earl of Macclesfield president of the Royal Society in 1759.

"The art of painting with burnt wax (says he) has long been lost to the world. The use of it by painters in the infancy of the art of painting, was of the utmost consequence. Drying oil being unknown, they had nothing to preserve their colours entire from the injury of damps and the heat of the sun; a varnish of some sort was therefore necessary; but they being unacquainted with distilled spirits, could not, as we now do, dissolve gums to make a transparent coat for their pictures; this invention therefore of burnt wax supplied that defect to them; and with this manner of painting, the chambers and other rooms in their houses were furnished: this Pliny calls encenflum, and we encaustic painting.

"The following experiments which I have the honour to lay before your Lordship and the Society, were occasioned by the extract of a letter from the abbe Mazeau, translated by Dr Parfons, and published in the second part of the XLIXth volume of the Philosophical Transactions, p. 100 concerning the ancient method of painting with burnt wax, revived by Count Caylus.

"The Count's method was, 1. To rub the cloth or board designed for the picture simply over with bees wax. 2. To lay on the colours mixed with common water; but as the colours will not adhere to the wax, the whole picture was first rubbed over with (a) Spanish chalk, and then the colours are used. 3. When the picture is dry, it is put near the fire, whereby the wax melts, and absorbs all the colours.

"Exp. 1. A piece of ock-board was rubbed over with bees-wax, first against the grain of the wood, and then with the grain, to fill up all the pores that remained after it had been planed, and afterwards was rubbed over with as much dry Spanish white as could be made to stick on it. This, on being painted (the colours mixed with water only), was clogged the pencil, and mixed too unequally with the ground, that it was impossible to make even an outline, but was so much thicker in one part than another, that it would not bear so much as the name of painting; neither had it any appearance of a picture. However, to pursue the experiment, this was put at a distance from the fire, on the hearth, and the wax melted by slow degrees; but the Spanish white (though laid as smooth as fo soft a body would admit, before the colour was laid on), on melting the wax into it, was not sufficient to hide the grain of the wood, nor show the colours by a proper whiteness of the ground; the wax, in rubbing on the board, was unavoidably thicker in some parts than in others, and the Spanish white the same: on this I suspected there must be some mistake in the Spanish white, and made the inquiry mentioned (in the note a).

"To obviate the inequality of the ground in the first experiment:

"Exp. 2. A piece of old wainfoot (oak board) 1/4 of an inch thick; which, having been part of an old drawer, was not likely to shrink on being brought near the fire; this was smoothed with a soft, flat, made quite warm before the fire; and then, with a brush dipped in white wax, melted in an earthen pipkin, simmered all over, and applied to the fire again, that the wax might be equally thick on all parts of the board, a ground was laid (on the waxed board), with levigated chalk mixed with gum water, (viz. gum Arabic dissolved in water); when it was dry, I painted it with a kind of landscape; and pursuing the method laid down by Count Caylus, brought it gradually to the fire. I fixed the picture on a fire screen, which would preserve the heat, and communicate it to the back part of the board. This was placed first at the distance of three feet from the fire, and brought forwards by slow degrees, till it came within..."


Exp. 3. I mixed three parts white wax, and one part white resin, hoping the tenacity of the resin might preserve the picture. This was laid on a board heated with a brush; as in the former; and the ground was chalk, prepared as before. This was placed horizontally on an iron box, charged with a hot heater, shifting it from time to time, that the wax and resin might penetrate the chalk; and hoping from this position, that the ground, blotted by melting the wax, would subside into its proper place; but this, like the other, came from the board, and would not all adhere.

Exp. 4. Prepared chalk four drams, white wax, white resin, of each a dram, burnt alabaster half a dram, were all powdered together and sifted, mixed with spirit of molasses instead of water, and put for a ground on a board finedear with wax and resin, as in Exp. 3. This was also placed horizontally on a box-iron as the former: the picture blistered, and was cracked all over; and though removed from the box-iron to an oven moderately heated (in the same horizontal position), it would not subside, nor become smooth. When it was cold, I took an iron spatula made warm, and moved it gently over the surface of the picture, as if I were to spread a plaster. (This thought occurred, from the board being prepared with wax and resin, and the ground having the same materials in its composition, the force of the spatula might make them unite). This succeeded so well, as to reduce the surface to a tolerable degree of smoothness; but as the ground was broke off in many places, I repaired it with flake white, mixed up with the yolk of an egg and milk, and repainted it with molasses spirit (instead of water), and then put it into an oven with a moderate degree of heat. In this I found the colours fixed, but darker than when it was at first painted; and it would bear being washed with water, not rubbed with a wet cloth.

Exp. 5. A board (that had been used in a former experiment) was finedear with wax and resin, of each equal parts; was wetted with molasses spirit, to make whitening (or Spanish white) mixed with gum-water adhere. This, when dry, was scraped with a knife, to make it equally thick in all places. It was put into a warm oven, to make the varnish incorporate partly with the whitening before it was painted; and it had only a small degree of heat: water only was used to mix the colours. This was again put into an oven with a greater degree of heat; but it flaked off from the board: whether it might be owing to the board’s having had a second coat of varnish (the first having been scraped and melted off), and that the unctuous parts of the wax had entered its pores, that it would not retain a second varnish, I cannot tell.

Exp. 6. Having mischanced in these trials, I took a new board, planed smooth, but not polished either with a felt-skin or rushes; I warmed it, and finedear it with wax only; then took sinuus (tobacco pipe clay) dissolved of its fat, by being dissolved in water and poured off, leaving the coarse heavy parts behind. After this was dried and powdered, I mixed it with a small quantity of the yolk of an egg and cow’s milk, and made a ground with this on the waxed board: this I was induced to try, by knowing that the yolk of an egg will dissolve almost all unctuous substances, and make them incorporate with water; and I apprehended that a ground, thus prepared, would adhere so much the more firmly to the board than the former had done, as to prevent its flaking off. The milk, I thought, might answer two purposes; first, by uniting the ground with the wax; and secondly, by answering the end of size or gum-water, and prevent the colours from sinking too deep into the ground, or running one into another. When the ground was near dry, I smoothed it with a pallet knife, and washed with milk and egg where I had occasion to make it smooth and even: when dry I painted it, mixing the colours with common water; this, on being placed horizontally in an oven only warm enough to melt the wax, flaked from the board; but held so much better together than any of the former, that I pasted part of it on paper.

Exp. 7. Flake-white (or purest fort of white-lead) mixed with egg and milk, crumbled to pieces in the oven, put on the waxed board, as in the last experiment.

The bad success which had attended all the former experiments, led me to consider of what use the wax was in this kind of painting: and it occurred to me, that it was only as a varnish to preserve the colours from fading.

In order to try this:

Exp. 8. I took what the brick-layers call fine stuff, or putty (v): to this I added a small quantity of burnt alabaster, to make it dry: this I soon did in the open air; but before I put on any colours, I dried it gently by the fire, left the colours should run. When it was painted, I warmed it gradually by the fire (to prevent the ground from cracking) till it was very hot. I then took white wax three parts, white resin one part, melted them in an earthen pipkin, and with a brush spread them all over the painted board, and kept it close to the fire in a perpendicular situation, that what wax and resin the plaster would not absorb might drop off. When it was cold, I found the colours were not altered, either from the heat of the fire, or passing the brush over them. I then rubbed it with a soft linen cloth, and thereby procured a kind of gloss, which I afterwards increased by rubbing it with an hard brush; which was so far from scratching or leaving any marks on the picture, that it became more smooth and polished by it.

After I had made all the foregoing experiments, in conversation with my honoured and learned friend Dr Kidley, a fellow of this society, I said I had been trying to find out what the encaustic painting of the ancients was. Upon which he told me, that there was a passage in Vitruvius de Architetaura, relative to that kind of painting; and was so good as to transcribe it for me from the 7th book, chap. 9. De minuti temperatura. Vitruvius’s words are: At f aciis fabricar fuurit, & solasit expeditionei minias sacem form colorem retineres,
Which I thus translate: "But if any one is more wary, and would have the polishing [painting] with vermilion hold its colour, when the wall is painted and dry, let him take Carthaginian [Barbary] wax, melted with a little oil, and rub it on the wall with a hair-pencil; and afterwards let him put live coals in an iron vessel [chafing-dish], and hold it close to the wax, when the wall, by being heated, begins tofleet; then let it be made smooth: afterwards let him rub it with a (c) candle and (p) clean linen rags, in the same manner as they do the naked marble statues. This the Greeks call ευνοον. The cost of Carthaginian wax (thus put on) is so strong, that it neither suffers the moon by night, nor the sun's beams by day, to destroy the colour."

"Being satisfied, from this passage in Vitruvius, that the manner of using wax in Exp. 8. was right, I was now to find if the wax-varnished, thus burnt into the picture, would bear washing. But here I was a little disappointed; for rubbing one corner with a wet linen cloth, some of the colour came off; but washing it with warm water, and then letting it dry without wiping, the colour stood very well.

"A board painted, as in Exp. 8. was hung in the most smoky part of a chimney for a day, and exposed to the open air in a very foggy night. In the morning the board was being wet through, and the water ran off the picture. This was suffered to dry without wiping; and the picture had not suffered at all from the smoke or the dew, either in the ground or the colours; but when dry, by rubbing it, first with a soft cloth, and afterwards with a brush, it recovered its former gloss.

"Suspecting that some tallow might have been mixed with the white wax I had used, which might cause the colours to come off on being rubbed with a wet cloth, I took yellow wax which had been melted from the honeycomb in a private family, and consequently not at all adulterated: to three parts of this I added one part resin, and melted them together.

"Exp. 9. Spanish white, mixed with fish-glue, was put for a ground on a board, and painted with water-colours only. The board was made warm; and then the wax and resin were put on with a brush, and kept close to the fire till the picture had imbibed all the varnish, and looked dry. When it was cold, I rubbed it first with a linen cloth, and then polished it with water and an hard brush.

"In these experiments I found great difficulties with regard to colours. Many water-colours bring made from the juices of plants, have some degree of an acid in them; and these, when painted on an alkaline ground, as chalk, whitening, cinnabar, and plaster, are totally changed in their colours, and from green become brown; which contributes much to make the experiment tedious. I would therefore advise the use of mineral or metallic colours for this sort of painting, as most likely to preserve their colour: for although I neutralized Spanish white, by fermenting it with vinegar, and afterwards washed it very well with water, it did not succeed to my wish."

"These experiments, and this passage from Vitruvius, will in some measure explain the observation of that passage in Pliny which Dr Parsons, in his learned comment on the encaustic painting with wax, seems to depair of."

"Ceres pingens, was one species of encaustic painting. Exspect, inllum, may be translated, 'forced in by means of fire, burnt in': for whatever is forced in by the help of fire can be rendered into Latin by no other significant word that I know of but inllum. If this is allowed me, and I think I have the authority of Vitruvius (a writer in the Augustan age) for it, who seems to have wrote from his own knowledge, and not like Pliny, who copied from others much more than he knew himself, the difficulty with regard to this kind of painting is solved, and the encaustic with burnt wax recovered to the public.

"What he means by the next kind he mentions, in eborre cferro id est viriculo, I will not attempt to explain at present."

"The ship-painting is more easily accounted for: the practice being in part continued to this time: and what is corruptly called breanum, for brenning or burning,"

"This is done by reeds set on fire, and held under the side of a ship till it is quite hot; then reinf, tallow, tar, and brimstone, melted together, and put on with an hair brush while the planks remain hot, make such a kind of paint as Pliny describes: which, he says, nec sole, nec sole, ventigi corrigat. As they were ignorant of the use of oil-painting, they mixed that colour with the wax, &c. which they intended for each particular part of the ship, and put it on in the manner above described."

"In the pictures painted for these experiments, and now laid before your lordship and the society, I hope neither the design of the landscape, nor the execution of it, will be so much taken into consideration as the varnish (which was the thing wanted in this inquiry): and I think that will evince, that the encaustic painting..."
ENC.

Encantio. wing with burnt wax is fully restored by these experiments; and though not a new invention, yet having been lost for so many ages, and now applied further, and to other parposes, than it was by Vitruvius (who confined it to vermillion only), may also amount to a new discovery, the use of which may be a means of preserving many curious drawings to posterity: for this kind of painting may be on paper, cloth, or any other substance that will admit a ground to be laid on it. The process is very simple, and is not attended with the disagreeable smell unavoidable in oil-painting, nor with any inconveniences inseparable from that art; and as there is no substance we know more durable than wax, it hath the greatest probability of being lasting.”

Still, however, there seem to have been some defects or inconveniences attending these and other subsequent attempts; for we find the ancient or some similar method of painting in wax remaining a desideratum upwards of 25 years after the publication of the preceding experiments; when in 1787 a method was communicated to the Society of Arts by Miss Greenland, for which she was rewarded with a prize. The ground of her information she received in Florence, through the acquaintance of an amateur of painting, who procured her the satisfaction of seeing some paintings in the ancient Grecian style, executed by Signora Parenti, a professor at that place, who had been instructed by a Jesuit at Pavia, the person who made the farthest discoveries in that art. Miss Greenland's friend knew how the wax was produced, informed her what were the materials the painters used, but could not tell her the proportions of the composition; however, from her anxiety to succeed in such an acquisition, she made various experiments, and at last obtained such a sufficient knowledge of the quantities of the different ingredients as to begin and finish a picture, which the afterwards presented to the Society for their inspection.

Her method is as follows: “Take an ounce of white wax, and the same weight of gum mastic powdered. Put the wax in a glazed earthen vessel over a very low fire; and when it is quite dissolved, blow into the mastic, a little at a time, stirring the wax continually until the whole quantity of gum is perfectly melted and incorporated; then throw the paste into cold water, and when it is hard, take it out of the water, wipe it dry, and beat it in one of Mr. Wedgwood's mortars, observing to pound it at first in a linen cloth to absorb some drops of water that will remain in the paste, and would prevent the possibility of reducing it to a powder, which must be so fine as to pass through a thick gauze. It should be pounded in a cold place, and but a little while at a time, as after long beating the friction will in a degree soften the wax and gum, and instead of their becoming a powder they will return to a paste.

“Make some strong gum-arabic water; and when you paint, take a little of the powder, some colour, and mix them together with the gum-water. Light colours require but a small quantity of the powder, but more of it must be put in proportion to the body and darks of the colours; and to black there should be about as much of the powder as colour.

“Having mixed the colours, and no more than can be used before they grow dry, paint with fair water, as is practised in painting with water-colours, a ground on the wood being first painted of some proper colour prepared in the same manner as is described for the picture; walnut-tree and oak are the sorts of wood commonly made use of in Italy for this purpose. The painting should be very highly finished; otherwise, when varnished, the tints will not appear united.

“When the painting is quite dry, with a hard brush, put in one way, varnish it with white wax, which is put into an earthen vessel, and kept melted over a very slow fire until the picture is varnished, taking great care the wax does not boil. Afterwards hold the picture before a fire, near enough to melt the wax, but not make it run; and when the varnish is entirely cold and hard, rub it gently with a linen cloth. Should the varnish blister, warm the picture again very slowly, and the bubbles will subside. When the picture is dirty, it need only be washed with cold water.”

The opinion given by the Society upon the above is: The method made use of by Miss Greenland provides against all inconveniences; and the brilliancy of the colours in the picture painted by her, and exhibited to the Society, fully justifies the opinion, that the art of painting in wax, as above described, highly merited the reward of a gold medal voted to her on this occasion.

ENCEINTE, in fortification, is the wall or rampart which surrounds a place, sometimes composed of battlements or curtains, either faced or lined with brick or stone, or only made of earth. The enceinte is sometimes only flanked by round or square towers, which is called a Roman wall.

ENCEPHALI, in medicine, worms generated in the head, which cause so great a pain as sometimes to occasion distraction.

The encephali are very rare; but there are some diseases wherein they swarm; from whence we are told phlebitial fevers have wholly arisen. Upon the distention of one who died of this fever, a little, short, red worm was found in the head, which soldiery wine, whereof horse-raddish had been boiled, could alone destroy. This medicine was afterwards tried on the sick, most of whom it cured.

The like worms have also been taken out by trepanning, and the patient cured. Those worms that generate in the nose, ears, and teeth, are also called encephali.

ENCHANTER, a person supposed to produce enchantment or fascination. See FASCIATION, WITCHCRAFT, &c.

ENCHANTER's Nightshade, in botany. See CIRCEA.

ENCHASING, IncHasing, or Chasing, the art of enriching and beautifying gold, silver, and other metal work, by some design or figures represented thereon in low relief.

Enchausing is practised only on hollow thin works, as watch-cases, case-heads, tweecer-cases, or the like. It is performed by puncturing or driving out the metal, to form a figure, from within out, so as to stand out prominent from the plane or surface of the metal. In order to this, they provide a number of fine steel blocks or punchkins of divers sizes; and the design being drawn on the surface of the metal, they apply the inside upon the head or tops of these blocks, directly under the lines or parts of the figures; then, with a fine
fine hammers, striking on the metal, sustained by the block, the metal yields, and the block makes an indentation or cavity on the inside, corresponding to which there is a prominence on the outside, which is to stand for that part of the figure.

Thus the workman proceeds to chase and finish all the parts by the successive application of the block and hammer to the several parts of the design. And it is wonderful to confider with what beauty and jauntness, by this simple piece of mechanism, the artificts in this kind will represent foliage, grotesques, animals, histories, &c.

Endicitica, in grammar, particles which are so closely united with other words as to form part of them, as in virumque, &c.—There are three enclitic particles in Latin, viz., que, ne, ve.

Encratites, in church history, heretics who appeared towards the end of the second century; they were called Encratites, or Continentes, because they gloried in abstaining from marriage and the use of wine and animal-food.

Endeavour, in natural history, a venomous insect found in Persia, and said to be a kind of tarantula. According to Olearius as quoted by Mr Boyle, it neither stings nor bites; but less fall its venom like a drop of water, which causes insufferable pain in the part for a time, and afterwards so profound a sleep, that nothing can awake the patient except cutting one of the creatures on the part affected. It is nevertheless said, that the sleep eat these insects without damage.

Encyclopedia, a term nearly synonymous with Cyclopedia; but adopted in preference to it in denominating the present work, as being more definite and of better authority. According to an observation of the late learned printer Mr Bower, the preposition en makes the meaning of the word more precise: For Cyclopedia may denote "the instruction or a circle," as Cypredia is "the instruction of Cyrus," whereas in Encyclopaedia the preposition determines the word to be from the dative of Cicely, "instruction in a circle." And Voltaire in his book De sept. fratern., has observed, "That Cyclopedia is used by some authors, but Encyclopaedia by the best."

Endemic, or Endemical, Diseases, those to which the inhabitants of particular countries are subject more than others, on account of the air, water, situation and manner of living.

Endive, in botany. See Chicorium.

Endless, something without an end: thus authors mention endless rolls, the endless screw, &c.

Endor, (anc. geog.), a town of Galilee, four miles to the south of Mount Tabor; in the tribe of Manasseh, where the Pythonsot was consulted by Saul: at this day, says Jerome, a large village.

Endorse, in heraldry, an ordinarv, containing the eight part of a pale, which Leigh says is only used when a pale is between two of them.

Endorsed, in heraldry, is said of things borne back to back, more usually called abdose.

Endorsement, in law and commerce. See Indorsement.

Endowment, in law, denotes the settling a dower on a woman: though sometimes it is used figuratively, for settling a provision upon a parson, on the building of a church; or the severing a sufficient portion of tithes for a vicar, when the benefice is appropriated.

Endymion, (fab. hist.), a shepherd, son of Αθηνίας and Calyce. It is said that he required of Jupiter to grant him to be always young, and to sleep as much as he would; whence the proverb of Endymions fominum dormire, to express a long sleep. Diana saw him naked as he slept on Mount Latmos; and was so struck with his beauty, that the came down from heaven every night to enjoy his company. Endymion married Chromia daughter of Itonius; by whom he had three sons Πας, Επες, and Αρλος, and a daughter called Εὐρυδίκη. The fable of Endymion's amours with Diana, or the moon, arose from his knowledge of astrology; and as he passed the night on some high mountain to ob serve the heavenly bodies it came to be reported that he was courted by the moon. Some suppose that there were two of that name; the son of a king of Elis, and the shepherd or astronomer of Carla. The people of Heraclis maintained that Endymion died on Mount Latmos, and the Eleans pretended to show his tomb at Olympia in Peloponnesus.

Enemy, in law, an alien or foreigner, who publickly invades the kingdom.

Enervate, in church-history, persons supposed to be possessed by the devil, concerning whom there were many regulations among the primitive Christians. They were denied baptism and the Eucharist; at least, this was the practice of some churches: and though they were under the care of exorcists, yet it was thought a becoming act of charity, to let them have the public prayers of the church, at which they were permitted to be present. See Exorcism.

Energy, a term of Greek origin, signifying the power, virtue, or efficacy of a thing. It is also used, figuratively, to denote emphasis of speech.

Enervating, the act of destroying the force, use, or office, of the nerves, either by cutting them, by weakening them with debauchery, or by some other violence.

Excels of wine, and other strong, hot, spiritual liquors, enervate or weaken the nerves. When they would render a horse useless, they enervate him, or cut his nerves.

Enfans perdus, the fame with forlorn hope. See Forlorn.

Enfilade, in the art of war, is used in speaking of trenches, or other places, which may be surrounded by the enemy's shot along their whole length. In conducting the approaches at a siege, care must be taken that the trenches be not enfiladed from any work of the place.

Enfine, formerly Antino; a city of Egypt, built by Adrian in honour of his favourite Antinous. It is situated towards the middle of the Suid, or Upper Egypt, and still contains several stately monuments of antiquity. In ancient times this city was very magnificent. It was about half a league in circumference, having two principal streets as wide, interfering each other at right angles, and running thro' its whole length. The others were more narrow, but equally straight; the two largest having gates at each end, part of which still remain. According to the Nubian geographer, it was
was called the city of the Magi, because Pharaoh is said to have caused the magicians to come thence to his court. Near it were the ruins of Abydus, where there was an oracle of the god Besa, one of the most ancient in Egypt, and which was still famous in the time of Constatines; and hence some have derived the appellation just mentioned, the neighbouring people coming in crowds to consult the oracle.

The ruins of the gates are the most beautiful pieces of architecture to be met with in this place. The handomest has three vaulted entries; the middle one being 60 feet in height, 22 wide, and 20 thick; the other two smaller. Each of the facades of this edifice is ornamented with four pilaiers in bas relief, with Corinthian capitals, the acanthus leaves of which have a considerable projection. It was surrounded by eight Corinthian columns, of which only one now remains, but the pedestals of the rest are still entire. Besides these, there are heaps of rubbish in different parts of the town; apparently the remains of ancient temples or palaces. All these seem to have been bordered by a colonnade, forming a portico on each side, where the inhabitants might walk secure from the heat of the sun. One of the squares was ornamented with four large Corinthian pillars, three of which are destroyed all but the bases. The fourth is quite entire, about 50 feet high, and the shaft composed of several flones. The pedestal has a Greek inscription, pretty much defaced, dedicating it to the emperor Alexander Severus, to whom the senate of Alexandria had already dedicated the famous column mentioned under that article. These four other columns were therefore probably raised in honour of that emperor after his victories over the Persians; for the foliage of the oak, with which the first stone of the shaft is decorated, was a sign of victory among the Romans. Towards the end of the fourth century the city was peopled by Christians; and Palladius assures us, that there were at that place 12 convents of virgins, and several others inhabited by monks. In the environs there are several coptic monasteries possessed by monks equally miserible and ignorable. The Nubian Geographer informs us, that the city was surrounded by a well cultivated country, abounding in fruits and harvests; but there have now given place to sands and barren deserts. The ruins of Abydus abovementioned are still to be seen near this place.

ENFRANCHISEMENT, in law, the incorporating a person into any society or body politic. ENGASTRIMYTHI, in Pagan theology, the Pythians, or priests of Apollo, who delivered oracles from without, without any action of the mouth or lips. The ancient philosophers, &c. are divided upon the subject of the engastrimythi. Hippocrates mentions it as disease. Others will have it a kind of divination. Others attribute it to the operation or possession of an evil spirit. And others to art and mechanism. M. Scottus maintains that the engastrimythi of the ancients were poets, who, when the priests could not speak, supplied the defect by explaining in verse what Apollo dictated in the cavity of the bason on the sacred tripod.

ENGENDERING, a term sometimes used for the act of producing or forming anything; thus meteors are said to be engendered in the middle region of the atmosphere, and worms in the belly.

ENGINE, in mechanics, is a compound machine, made of one or more mechanical powers, as levers, pulleys, fereves, &c. in order to raise, cast, or sustain any weight, or produce any effect which could not be easily effected otherwise. The word is formed from the Latin ingenium "with;" by reason of the ingenuity required in the contrivance of engines to augment the effect of moving powers.

ENGINE for extinguishing fires. See HYDROSTATICS, p. 23.

Pile-engine, one contrived for driving piles. See Steam-engine.

Steam-engine, a machine to raise water by fire, or rather by the force of water turned into steam. See Steam-engine.

ENGINEER, in the military art, an able expert man, who, by a perfect knowledge in the mathematics, delineates upon paper, or marks upon the ground, all forts of forts, and other works proper for offence and defence. He should understand the art of fortification, so as to be able, not only to discover the defects of a place, but to find a remedy proper for them; as also how to make an attack upon, as well as to defend, the place. Engineers are extremely necessary for these purposes: wherefore it is requisite, that besides being ingenious, they should be brave in proportion. When at a siege the engineers have narrowly surveyed the place, they are to make their report to the general, by acquainting him which part they judge the weakest, and where approaches may be made with most success. Their business is also to delineate the lines of circumvallation and contravallation, taking all the advantages of the ground; to mark out the trenches, places of arms, batteries, and lodgments, taking care that none of their works be flanked or discovered from the place. After making a faithful report to the general of what is a-doing, the engineers are to demand a sufficient number of workmen and utensils, and whatever else is necessary.

ENGLAND, the southern division of the island of Great Britain. Including Wales, it is of a triangular form, and lies between the 50th and 55th degrees of north latitude, extending about 400 miles in length from south to north, and in some places it is 300 miles in breadth. It is bounded by Scotland on the north; by the English Channel on the south, dividing it from France; by the German Sea on the east; and on the west by St. George's, or the Irish Channel.

At what time the island of Britain was peopled is whence uncertain; nor do we know whether the southern or peopled northern parts were first inhabited. We have no accounts that can be depended upon before the arrival of Julius Caesar, and it is certain he found the southern parts full of people of a very warlike disposition. These people, according to Caesar, were a colony of the Gauls; and this opinion is embraced by most of the ancient as well as the modern writers. It is chiefly founded on the agreement observed by the Romans between the two nations in their customs, manners, language, religion, government, way of fighting, &c. The more northern inhabitants, according to Tacit.
Before the time of Julius Caesar, the Romans had scarcely any knowledge of Britain; but that conqueror, having subdued most of the Gallie nations on the opposite side of the channel, began to think of extending his conquests by the reduction of Britain. The motive for this expedition, ascribed to him by Suetonius, was a desire of enriching himself by the British præts, which were then very much esteemed. The pretext, however, which he made use of in order to justify his invasion was, that the Britons had sent assistance to the Gauls during his wars with them.

Caesar undertook his first expedition against Britain when the summer was already far spent, and therefore he did not expect to finish the conquest of the country that campaign. He thought, however, that it would be a considerable advantage to view the island, and learn something of the manners and customs of the natives; after which he could more easily take such measures as would ensure a permanent conquest on his return. Having marched all his forces into the country of the Morini, now the province of Picardy, from whence was the shortest passage into Britain; he ordered at the same time all the vessels that lay in the neighbouring ports, and a fleet which he had built the year before for an expedition against the Morini, to attend him. The Britons, alarmed at his preparations, sent ambassadors with offers of submission; but Caesar, though he received them with great kindness, did not abandon his intended scheme of an invasion. He waited till the arrival of C. Volusius, whom he had sent out with a single galley to make discoveries on the coast. Volusius did not think proper to land; but, having made what observations he could, returned after five days absence, and Caesar immediately set sail for Britain. His force consisted of two legions embarked on board 80 transports; and he appointed 18 warships which lay wind-bound about eight miles off, to convey over the cavalry, but these last orders were too hastily executed, which occasioned some difficulty in his landing.

The Britons at this time, according to Caesar and Manner, other Roman historians, were very numerous, and had customs, their country well fenced with walls. Their houses were adorned with the like of the Gallic, and they used copper or iron plates weighed by a certain standard instead of money. Their towns were a confused parcel of houses placed at a small distance from one another, generally in the middle of a wood, to which all the avenues were slightly guarded with ramparts of earth, or with trees. All the nations were in a state of the most wretched barbarism, even when compared with the barbarous Gauls on the continent. The use of clothes was scarce known in the island. Only the inhabitants of the southern coast covered their nakedness with the skins of wild beasts; and this rather to avoid giving offence to the strangers who came to trade with them, than out of any principle of decency. It was a general custom among the Britons to paint their bodies with the juice of wood; but whether this was designed as ornament, or for any other purpose, is not known. They shaved their beards, all except their upper lip, and wore long hair. They also had their wives in common, a custom which made them detestable to all other nations.

The arms of the Britons were a sword, a short lance, and a shield. Breast-plates and helmets they looked upon rather to be incumbrances, and therefore made no use of them. They usually fought in chariots, some of which were armed with ferythes at the wheels; they were fierce and cruel, and exceedingly blood-thirsty. When driven to extremity, they could furnish themselves even on the bark and roots of trees; and Dio Cassius tells us, that they had ready on all occasions, a certain kind of food, of which, if they took but the quantity of a bean, they were not troubled with hunger or thirst for a considerable time after. The southern nations, however, were somewhat more civilized; and the Canti, or inhabitants of Kent, more than any of the rest.

All the British nations at this time were very brave and
England.

5 They oppose Cæsar's landing.

6 They are defeated and sue for peace.

7 Their treachery.

8 Cæsar returns.

9 The Britons.

The Britons no sooner perceived the Romans gone, than, as before, they broke through all their engagements. Of all the states who had promised to send hostages, only two performed their promises; and this neglect provoked Cæsar, that he determined to return the year following with a far greater force. Having, therefore, caused his old velites to be refitted, and a great many new ones to be built, he arrived off the coast of Britain with a fleet of 600 ships and 28 galleys. The Britons made no opposition to his landing; but Cæsar getting intelligence that an army was assembled at no great distance, marched in quest of them. He found them encamped on the banks of a river, fupposed to be the Teviot, about 12 miles distant from the place where he had landed. They attempted to oppose his passage; but being briskly attacked by the Roman cavalry, they were obliged to retire into a wood, all the avenues of which were blocked up by trees cut down for that purpose. This fortification, however, proved insufficient to protect them. The seventh legion having cast themselves into a trench, and thrown up a mound against their works, drove them from their asylum; but as the day was far spent, a pursuit was not thought advisable.

Next morning Cæsar, with the greatest part of his army, which he divided into three bodies, marched out in quest of the enemy. But when he was already come in sight of their rear, he was overtaken by mesfengers, who informed him, that his fleet was greatly damaged by a violent storm which had happened the preceding night. This put an end to the pursuit for that time; but Cæsar having employed all the carpenters he had with him, and sent for others from Gaul, in order to repair the damage, resolved to prevent misfortunes of this kind for the future. He therefore drew all his ships abreast, and inclosed them within the fortifications of his camp. This arduous undertaking employed his whole army for 10 days; after which he again set out in quest of the enemies.

The Britons had made the best use they could of the respite afforded them by the storm. They were headed by Calibelannus king of the Trinobantes. He had formerly made war upon his neighbours; and having rendered himself terrible to them, was looked up to be the most proper person for leading them on against the common enemy; and as several states had now joined their forces, the British army was very numerous. Their cavalry and chariots attacked the Roman army while on the march: but were repulsed with loss, and driven into the woods. The Romans pursued them too eagerly, and thus lost some of their own men; which encouraged the Britons to make another fierce attack: but in this also they were finally unsuccessful, and obliged to retire, though their loss seems not to have been great.

Next day the Britons suddenly attacked the Roman legions as they were foraging; but meeting with a vigorous resistance, they soon betook themselves to flight. The Romans pursued them so closely, that having neither time to rally or get down from their chariots according to custom, great numbers of them were cut in pieces; and this overthrow had such an effect upon the auxiliaries of hostages into Gaul which they had before promised. The same night he set sail, and soon arrived safe in Gaul.
England.

auxiliaries of Cassibelanus, that all of them abandoned him; nor did the Britons ever afterwards engage Caesar with united forces. Caesar, parading his victory, marched towards the Thames, with a design to cross that river, and enter the territories of the Trinobantes. The river was fordable only at one place, and that not without great difficulty; but when he came to it, he found the enemy's forces drawn up in a considerable body on the opposite bank, which was fortified with sharp stakes. They had likewise driven many stakes of the same kind into the bottom of the river, the tops of which were covered with water. These stakes are visible to this day at a place called Walton in Surrey. They are made of oak; and though they have been so long in the water, are as hard as Brazil, and as black as jet; and have sometimes been pulled out in order to make knife-handles of them.

Cæsar was not at all disheartened at these difficulties, which he had intelligence of by prisoners and deserters. He ordered the cavalry to enter first, and the foot to follow. His orders were obeyed, and the soldiers advanced with such resolution, that though the infantry were up to the chin in water, the enemy, unable to sustain their assault, abandoned the bank and fled. After this defeat, Cassibelanus himself deserted, and therefore dismissed all his forces except about 4000 chariots, with which he observed the motions of the Romans, harrying them by cutting off straggling parties, &c. This, however, was not sufficient to keep up the spirits of his countrymen. On the contrary, they deserted him from the kingdom, and chose Mandubatus, whose father had been murdered by Cassibelanus, who thereupon usurped the kingdom. The young prince had fled to Cæsar, who gave him protection; and the Trinobantes now offered to submit to the conqueror, provided he would give them Mandubatus for their king.

Cæsar readily complied with the request of the Trinobantes upon their sending him 40 hostages: and the submission of the Trinobantes was soon followed by that of other states and tribes; for each of the 17 nations already mentioned were composed of several different tribes, of which no particular account can be given.—Cæsar next marched to Verulamium, or Canti-perfectors. A peace was concluded on the following terms, viz. that the Britons should pay an annual tribute to the Romans, that Cassibelanus should leave Mandubatus in peaceable possession of his dominions, that he should not molest the Trinobantes, and that he should deliver a certain number of hostages. These terms being agreed to, Caesar set sail with his whole fleet from Britain, to which he never returned.

Such is the account given by Cæsar himself of his two expeditions into Britain; but other authors have spoken very doubtfully of his victories in that island. Dio Cassius tells us, that the Britons utterly defeated the Roman infantry, but were at last put in disorder by their cavalry. Horace and Tibullus, in many parts of their works, speak of the Britons as a people not yet conquered. Tacitus says, that Cæsar rather showed the Romans the way to Britain, than put them in possession of it; and Lucan tells us plainly, that Cæsar turned his back to the Britons and fled. This last, however, considering the confinmate military genius of Cæsar, is by no means probable. That he left Britain during the winter, was, in all probability, to prevent insurrections among the Gauls, which might very readily have happened; and that he did not return to finish his conquest can be no wonder, seeing his ambition would certainly be more gratified by being called emperor of Rome, than conqueror of Britain.

The departure of Julius Cæsar, which happened about 53 years before Christ, left the Britons without any fear of a foreign enemy. We are not, therefore, to imagine, that they would regard their promises of paying tribute; nor was it probably demanded for a good number of years afterwards. Augustus, however, when he had got himself fully established on the throne, had twice a design of invading Britain and forcing the inhabitants to pay the tribute promised to Julius Cæsar. Both times, however, he was prevented by revolts in different provinces in the empire, so that the Britons still continued to enjoy their liberty. They thought proper, however, to court the favour of the Romans as much as they could by pretended submissions; but, in the reign of Claudius, the Romans set about reducing them to subjection in good earnest. The occasion of the war with the Britons, which was renewed about 14 years after this war is related by Dio Cassius as follows. "Cæsar, the third in succession from Cassibelanus, being dead, his two sons, the Cæsars, succeeded to the throne; but whether they reigned jointly or separately, is not known. In their reign one Bericus, of whom we also know very little, being driven out of the island for attempting to raise a sedition, fled with some of his partisans to Rome, and persuaded Claudius to make war on his countrymen. The Britons, on the other hand, resented the behaviour of Claudius in receiving these vagabonds, and therefore prohibited all intercourse with the Romans. A much smaller offence than this would have been sufficient at any time to provoke that haughty nation to declare war. An army was therefore immediately ordered into Britain, under the command of Plautius praef- to the Romans, as much as they could by pretended submissions: but, in the reign of Claudius, the Romans set about reducing them to subjection in good earnest. The occasion of the war with the Britons, which was renewed about 14 years after this war is related by Dio Cassius as follows. "Cæsar, the third in succession from Cassibelanus, being dead, his two sons, the Cæsars, succeeded to the throne; but whether they reigned jointly or separately, is not known. In their reign one Bericus, of whom we also know very little, being driven out of the island for attempting to raise a sedition, fled with some of his partisans to Rome, and persuaded Claudius to make war on his countrymen. The Britons, on the other hand, resented the behaviour of Claudius in receiving these vagabonds, and therefore prohibited all intercourse with the Romans. A much smaller offence than this would have been sufficient at any time to provoke that haughty nation to declare war. An army was therefore immediately ordered into Britain, under the command of Plautius praef- to the Romans, as much as they could by pretended submissions: but, in the reign of Claudius, the Romans set about reducing them to subjection in good earnest. The occasion of the war with the Britons, which was renewed about 14 years after this war is related by Dio Cassius as follows. "Cæsar, the third in succession from Cassibelanus, being dead, his two sons, the Cæsars, succeeded to the throne; but whether they reigned jointly or separately, is not known. In their reign one Bericus, of whom we also know very little, being driven out of the island for attempting to raise a sedition, fled with some of his partisans to Rome, and persuaded Claudius to make war on his countrymen. The Britons, on the other hand, resented the behaviour of Claudius in receiving these vagabonds, and therefore prohibited all intercourse with the Romans. A much smaller offence than this would have been sufficient at any time to provoke that haughty nation to declare war. An army was therefore immediately ordered into Britain, under the command of Plautius praef-
England, to land in three different places of Britain at once. Being driven back by contrary winds, their fears began to return; but they resumed their courage on the appearance of a meteor shooting from the east, which they imagined was sent from heaven to direct their course. They landed without opposition; and the Britons, not having drawn together a sufficient army, kept in small bodies behind their marshes, and in woods, in order to spin out the war till winter; which they imagined Plautius would, like Caesar, spend in Gaul.

The Roman general marched first in quest of the two kings Togodumnus and Caractacus; both of whom he found out, and defeated one after another. He then reduced part of the Dobunii, at that time subject to the Cartimandua; and leaving a garrison to keep them in awe, he advanced to a river where the Britons lay carelessly encamped, supposing that the Romans could not pass it without a bridge. But the Germans in the Roman army had been accustomed to swim across the strongest currents in their heavy armour. They therefore passed the river first; and having, according to their orders, fallen only upon the enemy's horsethick drew their chariots, these formidable machines were rendered entirely useles; and the Britons were put to flight as soon as another part of the forces could pass the river.

The Britons were not disheartened with this defeat, but engaged the Romans next day with great bravery. Victory continued long doubtful; but at length the Romans prevailed, and the Britons were forced to be forlorn without the gates by the emperor himself, Plautius, however, was so far from being disheartened, that, on having landed after a voyage, he marched up the river to the mouth of the Thames. From thence the Britons fled to the mouth of the Thames. From thence the Britons fled to the mouth of the Dordogne; and where the sides of the mountain; and where the sides of the river, were of great advantage. The Germans, however, crossed by swimming as before, and the left on a bridge somewhat further up the river, so that the Britons were in a short time surrounded on all sides, and great numbers of them cut in pieces. Many of the Romans, also, pursuing the fugitives with too great eagerness, were left in the marshes. In one of these battles Togodumnus was killed; but the Britons were so far from being disheartened, that they showed more eagerness than ever to oppose the Romans, in order to revenge his death. Plautius, therefore, did not think proper to penetrate farther into the country, but contented himself with putting garrisons in the places he had already conquered. He then wrote to the emperor himself; who no sooner received an account of his successes, than he set out for Britain; where, having landed after a short voyage, he joined Plautius on the banks of the Thames.

Soon after the arrival of Claudius, the Romans passed the Thames, attacked the Britth army, and totally defeated it. The consequence of this was the taking of Cunobelinus's capital, and the subjection of several of the neighbouring states. The emperor, however, did not make a long stay in the island, but left Plautius to pursue his conquests. This he did with such success, that, on his return to Rome, he was met without the gates by the emperor himself, who, at his solemn entry, gave him the right hand. The Britons seem to have made a very obstinate resistance to the Roman arms about this time. Vespasian, who was afterwards emperor, is said to have fought 30 battles with them; and the exploits of Titus his son are also much celebrated by the Roman historians.

In the ninth year of Claudius, P. Ostorius Scapula was sent into Britain. By far the greater part of the 17 nations formerly mentioned were at this time unconquered. Some of these had broken into the Roman territories; but Ostorius falling unexpectedly upon them, put great numbers to the sword, and dispers'd the ret. To prevent them for the future from making incursions into the territories of the Romans or their allies, he built several forts on the Severn, the Avon, and the Nen, reducing the country south of these rivers to a Roman province. This so highly offended the Icenii, that, being joined by the neighbouring nations, they raised a considerable army, and encamped in an advantageous situation, in order to prevent the Romans from penetrating farther into the island. Ostorius, however, soon advanced against them. The Romans, as usual, got the victory, and the enemy were pursued with great slaughter. The Roman general, however, having quelled an insurrection among the Brigantes, led his army against the Silures. They were headed by their king Caractacus, a most renowned warrior. He showed his military talents by choosing a very advantageous place for engaging the enemy. Tacitus tells us, "It was on the ridge of an exceedingly steep mountain; and where the sides of it were inclining and accessible, he reared walls of stone for a rampart. At the foot of the mountain flowed a river dangerous to be forded, and an army of men guarded his entrenchments." This hill is thought to be one called Caer-Caradoc in Shropshire, situated near the conflux of the rivers Conon and Teme, and where the remains of ancient entrenchments are still visible.—On the approach of the enemy, Caractacus drew up his troops in order of battle, animating them with the following speech, according to Tacitus. "That from this day, and this battle, they must date their liberty reduced, or their slavery for ever established." He then invoked the shades of those heroes who had expelled Caesar the dictator; those brave men by whose valor they still enjoyed freedom from Roman tribute and taxes, and by which their wives and children were as yet preserved from prostitution." The whole army then took a solemn oath either to conquer or die, and prepared for the charge with the most terrible shouts. Ostorius was somewhat dismayed when he considered the uncommon strength of the enemy, and the other difficulties which he had to encounter. He led on his men, however, to the charge; and the Romans were attended with their usual good fortune. The Britons were put to flight. Vast numbers fell on the field of battle and in the pursuit, and many more were taken prisoners. Among the latter were the wife, the daughter, and the brothers, of Caractacus. The unfortunate prince himself fled to Cartimandua queen of the Brigantes, by whom he was delivered up to the Roman general, who sent him in chains to Rome. Caractacus bore his misfortunes with magnanimity; and when he came before the emperor, addressed him in the following terms. "If my moderation in prosperity, O Emperor Claudius! had been as conspicuous as my birth and fortune, I should now have entered this city as a friend, and not as a prisoner; nor would you have disdained the
England.

the friendship of a prince descended from such illustrious ancestors, and governing so many nations. My present condition, I own, is to you honourable, to me humiliating. I was lately possessed of subjects, horses, arms, and riches. Can you be surprised that I endeavoured to preserve them if you Romans have a desire to arrive at universal monarchy, must all nations, to gratify you, tamely submit to servitude? If I had submitted without a struggle, how much would it have detached the heart of my fall, and of your victory? And now, if you resolve to put me to death, my story will soon be buried in oblivion; but, if you think proper to preserve my life, I shall remain a lasting monument of your clemency."—This speech had such an effect upon Claudius, that he immediately pardoned Caractacus and his whole family, and commanded them to be set at liberty.

The Silures, notwithstanding this terrible blow, continued the war with great vigour, and gained considerable advantages over the Romans; which so much affected Ostorius, that he died of grief. He was succeeded by A. Didius, who restrained the incursions of the Silures, but was not able to restore Carlismunda quite to the Britons, who had been deprived of her subjects. Didius was succeeded by Veranius, and he by Suetonius Paulinus, who reduced the island of Anglesey, as related under that article. But while Paulinus was employed in the conquest of this island, he was alarmed by the news of an almost universal revolt among those nations which had submitted to the Romans. The Britons, the conquered, had still a desire of returning to their former state of independence; and the Roman yoke became every day more unpleasant to them through the insobriety and oppressions of the Roman soldiery. The Britons had been long discontented, and were already in a very proper disposition for a revolt, when an event happened which kindled these discontents into an open flame. Praefutus, king of the Iceni, a prince renowned for opulence and grandeur, had, by his last will, left the Roman emperor joint-heir with his two daughters, in hopes of obtaining his favour and protection by so great an obligation. But the event turned out very different. No sooner was he dead, than his houses and possessions were all plundered by the Roman soldiery. The queen Boadicea remonstrated against this injustice; but, instead of obtaining any redress, the herself was publicly whipped, her daughters ravished, and all the relations of the late king reduced to slavery. The whole country also was plundered, and all the chiefs of the Iceni deprived of their possessions.

Boadicea was a woman of too haughty a spirit tamely to bear such indignities. She therefore prevailed the Iceni to take up arms, which they very readily did. Then, being joined by the Trinobantes, and some other nations, they poured like a torrent on the Roman colonies. Every thing was destroyed with fire and sword. The ninth legion, which had been left for the defence of the country under Petullus Cerealis, was defeated, the infantry totally cut in pieces, and the commander himself with the cavalry escaped with the utmost difficulty. Suetonius, alarmed at this news, immediately left Anglesey, and marched with the greatest expedition to London. The inhabitants were overjoyed at his arrival, and used their utmost endeavours to detain him for their defence. But he refused to stay, and in a short time left the place, notwithstanding the importunities of the inhabitants. The whole city lamented his departure; and they had reason. Suetonius was scarce gone, when Boadicea with her Britons entered, and put all they found in it to the sword. None were taken prisoners, nor was any sex or age spared, and many were tortured in the most cruel manner. Seventy thousand persons are said to have perished on this occasion at London, and other Roman cities.

The Britons, now elated with success, assembled from all quarters in great numbers, so that Boadicea’s army soon amounted to 230,000 men. They defied the Romans; and became so confident of victory, that they brought their wives and children along with them in wagons to be spectators of the destruction of their enemies. The event was what might naturally have been expected from such ill judged confidence. The Britons were overthrown with most terrible slaughter, no fewer than 80,000 being killed in the battle and pursuit: while the Romans had not above 400 killed, and not many more wounded. Boadicea, not able to survive so great a calamity, put an end to her life by poison.

By this overthrow the Britons who had once been subdued were thoroughly prevented from raising any more insurrections, and even those who had not yet submitted to the Roman yoke seemed to be intimidated from making incursions into their dominions. Nothing remarkable therefore happened for some time. In the time of Vespasian, Petullus Cerealis being appointed governor of Britain, attacked the Brigantes, defeated them in several battles, and reduced great part of their country. He was succeeded by Julius Frontinus; who not only maintained the conquests of his predecessor, but reduced entirely the warlike nation of the Silures. Frontinus was succeeded by the celebrated Cneius Julius Agricola, who completed the conquest of all the southern Britons.

Just before the arrival of Agricola, the Ordovices had cut in pieces a band of horse stationed on their confines, after which the whole nation had taken arms. The summer was very fair and pleasant, and the Roman army was quite separated and dispersed, the soldiery having affured themselves of rest for the remaining part of the year. Agricola, however, was no sooner landed, than having drawn together his legions, he marched against the enemy without delay. The Britons kept upon the ridges of the mountains; but Agricola led them in person up the ascents. The Romans were victorious; and such a terrible slaughter was made of the Britons that almost the whole nation of Ordovices was cut off. Without giving the enemy time to recover from the terror which this overthrow had occasioned, Agricola resolved upon the immediate reduction of Anglesey, which had been left by the revolt of Boadicea. Being detached from ships, he detached a chosen body of auxiliaries who knew the fords, and were accustomed to manage their arms and horses in the water. The Britons, who had expected a fleet and transports, were so terrified by the appearance of the Roman forces on their island that they immediately submitted, and Anglesey was once more refored to the Romans.

With the conquest of Anglesey ended the first campaign.
marched into the territories of the Caledonians, where he put all to fire and sword. He advanced even to the most northerly parts of the island; and though no battle was fought in this expedition, yet through the continual ambuscades of the enemy, and the inhospitable nature of the country, he is said to have lost 50,000 men. At last the Caledonians were obliged to sue for peace; which was granted them on condition of their yielding part of their country, and delivering up their arms. After this the emperor returned to York, leaving his sons Caracalla to command the army, and finish the new wall which had been begun between the friths of Forth and Clyde. But the emperor being taken ill at York, the Caledonians no sooner heard of his indisposition, than they again took up arms. This provoked Severus to such a degree, that he commanded his sons Caracalla to enter their country anew with the whole army, and to put all he met to the sword without distinction of sex or age. Before these orders, however, could be put in execution, his two sons, having concluded a shameful peace with the Caledonians, returned to Rome.

A long chasm now takes place in the history of the Roman dominions in Britain. In the beginning of Diocletian's reign, Carausius a native of Gaul, falling over into Britain, took upon him the title of emperor, and was acknowledged by all the troops quartered there. He was, however, killed in a battle with one of Constantius's officers, after he had enjoyed the sovereignty for six or seven years. Constantine the Great began his reign in this island; and returned soon after he had left it, probably with a design to put a stop to the daily incursions of the Caledonians. He altered the division of that part of Britain subject to the Romans. Severus had divided it only into two provinces; but Constantine increased the number to three: viz. Britannia Prima, Britannia Secunda, and Maxima Caesariensis; and this last was afterwards divided into two, viz. Maxima Caesariensis and Plavia Caesariensis. The removal of the imperial seat from Rome to Constantinople, which happened in the reign of Constantine, gave the northern nations an opportunity of making frequent incursions into the Roman province; the emperor having carried with him, first into Gaul, and then into the East, not only most of the Roman troops, but likewise the flower of the British youth.

About the latter end of the reign of Constantius, Constantine the Great, the government of the province of Britain and other western parts of the empire, was committed to Julian, afterwards called the Apostate. While he was in his winter-quarters at Paris, he was informed that the Scots and Picts, about this time first distinguished by these names, had broken into the Roman territories and committed everywhere the most dreadful ravages. Against them Julian dispatched a body of troops under the command of Lupicinianus. He embarked from Bologna in the depth of winter, but was not sooner arrived at London than he was recalled; the enemy having probably found means to appraise Julian by their submissions. Till the reign of Valentinian I, these nations still continued to infest the Roman territories in Britain, and had now reduced the country to a most deplorable condition by their continual ravages. Valentinian sent against them Theodoric, father to the emperor of that name. That general
The Britons immediately set about building the wall, as they had been desired, with great alacrity. But as it was constructed only of turf, the Scots and Picts soon broke it down in several places; and, pouring in upon the defended and effeminate provincials, committed more cruel ravages than ever. At last, after very many and grievous calamities, the latter sent ambassadors once more to Rome. These appeared with their garments rent and blood on their heads; and at last prevailed on the emperor, by their earnest intreaties, to send another legion to their relief. The troops arrived in Britain before the enemy had the least knowledge of their having fet foot. They were therefore quite unprepared for an attack, and roving up and down the country in the utmost disorder. The Romans made a terrible havoc among them, and drove the remainder into their own country. As Honorius had lent them not with any ambitious view of retaining the island in subjection, but merely out of compunction to the unhappy provincials, the Romans told them, therefore, that they would now no farther assistance to expect from them. They informed them, that the legion must immediately return to the continent, to protect the empire from the barbarians, who had extended their ravages to almost every part of it; and therefore, that they must now take their last farewell of Britain, and totally abandon the island. After this declaration Gallo, the commander of the Roman troops, exhorted the provincials to defend themselves, by fighting bravely for their country, wives, and children, and what ought to be dearer than life itself, their liberty; telling them, at the same time, that their enemies were no stronger than themselves, provided they would but lay aside their fears, and exert their ancient courage and resolution. That they might the better withstand the attacks of the enemy, he advised them to build a wall, not of turf, but of stone: offering to assist them with his soldiers, and to direct them himself in the execution. Upon this the Britons immediately fell to work; and with the assistance of the Romans, finished it in a short time, though it was no less than eight feet thick, and twelve feet in height. It is thought to have been built on the same place where Severus's wall formerly stood. Towers were also built at convenient
they began again to cultivate their lands; which having lain fallow for a long time, now produced all sorts of corn in the greatest plenty. This plenty, according to the historian Gildas, occasioned the most confummate wickedness and corruption of manners among all ranks of men. The clergy, says he, who should have reclaimed the laity by their example, proved the ringleaders in every vice; being addicted to drunkenness, contentiousness, envy, &c.—It is possible, however, that this description might be exaggerated by Gildas, who himself was a monk. But however this was, the Britons had not long enjoyed peace, when they were alarmed by a report that the Scots and Picts were about to return with a far greater force than before, utterly to extinguish the name of their southern neighbours, and seize upon the country for themselves.

This report threw them into a terrible threatened conformation; and to add to the rest of their misfortunes, they were now visited by a dreadful plague, which raged with such violence, that the living were scarce sufficient to bury the dead. The contagion no sooner ceased, than they found their country invaded by the Scots and Picts, who destroyed every thing with fire and sword; so that the provincials were soon reduced to the same miserable state they had formerly been in.

At this time the chief, if not the only, king of the southern division of Britain, was one Forcigern. He is said to have been a cruel, debauched tyrant, regardless of the public welfare, and totally incapable of promoting it. Being now rooted from his sensibility, however, by a sense of his own danger, he summons a council of the chief men of the nation, in order to deliberate about the proper means for delivering the country from those calamities under which it groaned. In this council the most pernicious measure was adopted; that could possibly have been resolved on, namely, to invite to their assistance the Saxons, a people famous for their piracies and cruelty, and justly dreaded by the Britons themselves. This fatal expedient being agreed upon, ambassadors were immediately dispatched into Germany with advantageous proposals to the Saxons in case they would come over to their assistance.

The British ambassadors soon arrived in Germany, and according to Witichind, a Saxon historian of the ninth century, made the following speech before an assembly of the Saxons.—"Illustrious Saxons, the fame of your victories having reached our ears, the disfavored Britons, harassed by the continual inroads of a neighbouring enemy, send us to implore your assistance. We have a fertile and spacious country, which we are commanded to submit to you. We have hitherto lived under the protection of the Roman empire, but our ancient masters having abandoned us, we know no nation more powerful than you, and better able to protect us. We therefore return to your valour. For sake us not in our distress, and we shall readily submit to what terms you yourselves shall think fit to prescribe to us."—If this abrupt and shameless speech was really made, it must give us a very strange idea of the national spirit of the provincial Britons at that time. It is, however, probable that the whole is a fiction, designed only to excite the perfidious treatment which their Britons afterwards received from the Saxons.
The most respectable even of the Saxon historians make no mention of such a speech; and it is certain, that when the Saxons themselves wanted to quarrel with the Britons, they never insisted upon the promise made by the British ambassadors; which they most certainly would have done, had any such promise ever been made.

The British ambassadors were very favourably received by the Saxons. The latter embraced their proposal with joy; and the rather, because their foothsayers foretold that they should plunder their British allies for 150 years, and reign over them for twice that time. Three long ships, in the Saxon language called cedres, were therefore fitted out, under the conduct of Hengist and Horfa. These were two brothers much celebrated both for their valor and nobility. They were sons of Wituigifil, said to be great-grandson to the Saxon god Woden; a circumstance which added much to their authority. Having embarked about 1600 men on board their three vessels, the two brothers arrived in the isle of Thanet, in the year 449 or 450.

They were received by the inhabitants with the greatest demonstrations of joy: the isle in which they had landed was immediately appointed for their habitation; and a league was concluded, in virtue of which the Saxons were to defend the provincial Britons against all foreign enemies; and the provincials were to allow the Saxons pay and maintenance, besides the place allotted then for their abode. Soon after their arrival, king Vortigern led them against the northern nations who had lately broke into the kingdom, and advanced as far as Stanfod in the county of Lincolnshire. Here a battle was fought, in which the Scots and Picts were utterly defeated, and obliged to relinquish their booty.

Vortigern was so highly pleased with the behaviour of his new allies, that he bestowed large possessions in the country they had newly delivered, upon the two commanders Hengist and Horfa. It is said, that, even at this time, Hengist was taken with the wealth and fertility of the country; and at the same time observing the inhabitants to be quite enervated with luxury, began to entertain hopes of conquering part of it. He therefore, with Vortigern’s consent invited over some more of his countrymen; giving them notice at the same time of the fruitfulness of the country, the efficacy of the inhabitants, and how easily a conquest might be effected.

The Saxons readily complied with the invitation; and, in 452, as many more arrived in 17 vessels, as, with those already in Britain, made up an army of 5000 men. Along with these, according to Nennius, came over Rowena the daughter of Hengist. Vortigern fell in love with this lady; and in order to obtain her in marriage, divorced his lawful wife. Hengist pretended to be averse to the match; but Vortigern obtained his consent by inveighing him with the sovereignty of Kent. The Saxon historians, indeed, make no mention of Rowena; but rather intimate, that their countrymen made themselves masters of Kent by force of arms. It seems most probable, however, that Vortigern had as yet continued his friendship with the Saxons, and even put more confidence in them than in his own subjects. For, not long after the arrival of this first reinforcement, Hengist obtained leave to send for a second, in order, as was pretended, to defend the king from the attempts of his rebellious subjects, as well as of the Scots and Picts. These embarked in 40 ships, under the command of Octa and Ebuba, the son and nephew, or, according to some, the brother and nephew of Hengist. They landed at the Orkney islands; and having ravaged them, as well as all the northern coasts of Scotland, they conquered several places beyond the Frith, and at last obtained leave to settle in Northumberland.

The pretence made for this settlement was, that the Saxons under Octa and Ebuba might defend the northern frontiers of the kingdom, as those under Hengist and Horfa did the southern parts. Many more Saxons were, under various pretences, invited over; till at last the colonies from whence they came were in a manner depopulated. And now their numbers being greatly increased, the Saxons began to quarrel with the natives. They demanded larger allowances of corn, and other provisions: threatening to lay waste the whole country if their demands were not complied with. The Britons, instead of complying with these demands, desired them to return home, since their numbers exceeded what they were able to maintain. Upon this, the Saxons concluded a peace with the Scots and Picts; and, turning their arms against the unhappy provincials, over ran the whole country. The Saxons commit every where the greatest cruelties. All buildings whether public or private, they levelled with the ground. The cities were pillaged and burnt; and the people massacred without distinction of sex or age, and that in such numbers, that the living scarce sufficed to bury the dead. Some of those who escaped the general slaughter, took refuge among inaccessible rocks and mountains; but there great numbers perished with hunger, or were forced to surrender themselves as slaves to their enemies. Some crossed the sea and settled either in Holland or in Armorica, now the province of Brittany in France.

Vortigern, we are told by Nennius, was so far from being reclaimed by these calamities, that he added incessantly to his other crimes, and married his own daughter. At last, his own subjects, provoked at his enormous wickedness, and the partiality he shewed to the Saxons, deposed him, and raised his son Vortimer to the throne. He was a young man of great valour, and willingly undertook the defence of his disgraced country. He first fell upon the Saxons with what troops he could assemble, and drove them into the isle of Thanet. Here they were besieged, till, being reinforced by fresh supplies from Germany, they opened themselves a way through the British troops. Vortimer, however, was not discouraged. He engaged the Saxons on the banks of the Derwent in Kent, where he obtained a complete victory, and cut in pieces great numbers of the enemy. Another battle was fought at Aylesford in Kent. Some ascribe the victory at this time to the Saxons, and some to the Britons. It is certain, however, that Horfa the brother of Hengist was killed in the engagement. He is said to have been buried at a place in the neighbourhood, which from him obtained the name of Horsted.—A third battle was fought, in which the victory was uncertain, as is also the place where it happened. The fourth battle, however, according to Nennius, proved decisive...
England. decline in favour of the Britons. Vortigern engaged his enemies according to some, at Folkstone; according to others, at a place called Stoner, in the isle of Thanet. The Saxons were defeated with great slaughter, and driven back to their ships. So complete is this victory said to have been, that the Saxons quitted the island, without making any attempt upon it for five years afterwards. These battles, however, retrench entirely upon the credit of Nennius, and the historians who have followed him. They are taken notice of neither by Gildas nor Bede. The former only acquaints us, that the Saxons retired. This, by most historians, is understood of their returning home; tho' it is possible he might mean no more, than that, after they had laid waste the country, they retired into the territories allotted them by Vortigern, in Kent and Northumberland.

Vortigern is said to have died after a reign of six years. On his death-bed, he directed his servants to bury him near the place where the Saxons used to land; being persuaded, that the virtue of his bones would effectually prevent them from ever touching the British shore. This command, however, was neglected; and Vortigern was buried at Lincoln, according to some, or London, or according to others. Hengist was no longer informed of his death, than he invaded Britain anew with a numerous body of Saxons. He was opposed by Vortigern, who had been restored to the throne after the death of his son Vortigern. Several battles were fought on this occasion; but at last the provincials being overthrown at a place called Greenford, with the loss of 4000 men, were obliged to abandon Kent to their enemies, and retire to London. This happened about the year 438 or 439; and from this time most historians date the erection of the first Saxon kingdom in Britain, viz. that of Kent. Hengist assumed the title of king, and chose Elik his son for his colleague.

The Britons under Vortigern still continued the war. Hengist finding himself unable to gain a decisive advantage over them in the field, had recourse to treachery. He pretended to be desirous of concluding a peace with the British monarch, and of renewing his ancient friendship with him; and therefore required an interview. To this Vortigern readily consented, and accepted of an entertainment prepared for him by Hengist. The king was attended by 300 nobility all unarmed, but the Saxons had concealed daggers below their garments. The British nobility were all treacherously massacred in the height of their mirth; Vortigern himself was taken and put in fetters; nor could his liberty be procured, but by ceding to the Saxons these provinces now called Ejeox, Suaffr, and Middlesex. Thus the Saxons got such a footing in Britain that they could never afterwards be expelled. Vortigern, after being set at liberty, is said to have retired to a vast wilderness near the fall of the Wye in Radnorshire, where he was some time after concealed by lightning, together with a city called Kur Courtigern which he had built in that place.

On the retreat of Vortigern, the command of the British forces devolved upon Aurelius Ambrosius, or, as Gildas calls him Ambrosius Aurelianus. He was a Roman, and perhaps the last that remained on the island. He is said to have gained several victories over the Saxons. Notwithstanding this, however, they still continued to gain ground; and in the year 491, the foundation of a second Saxon kingdom was laid in Britain. This at first comprehended only the county of Suffolk, but soon extended over most of the countries lying south of the Humber. It was called the kingdom of the South Saxons.

The German nations being now informed of the good success which had attended the Saxons in Britain, new adventurers daily flocked over to share the good fortune of the others. They were chiefly composed of three nations, the Saxons,Angles, and Jutes. All these were placed under the common appellation sometimes of Saxons, sometimes of Angles. They spoke the same language, and agreed very much in their customs and institutions, so that all of them were naturally led to combine against the natives. The most active of these adventurers was Cerdic a Saxon, said to be the tenth in descent from Woden. He landed with his son Cenric, and as many men as he could convey in five ships, at Yarmouth in Norfolk. The provincials immediately attacked him with great vigour; but after a short engagement, they were totally defeated. Many other battles were fought, the event of which was always favourable to the Saxons, so that the Britons were forced to abandon their sea-coasts to them.

In 497, Porta, another Saxon, with his two sons Bleda and Magia, arrived at Portsmouth, so called, as some imagine, from this chieftain. The provincials, under the command of a young prince a native of the country, attempted to oppose the landing of the Saxons; but his army was defeated with great slaughter, and himself killed in the engagement; after which Porta made himself master of all the neighbouring country. The progres of Cerdic, however, alarmed the Britons more than that of all the other Saxon princes. About the year 508, therefore, Nazaleod, styled, by Henry of Huntingdon, the greatest of all the British kings, assembled almost the whole strength of the provincial Britons in order to drive him out of the island. Cerdic on the other hand took care to strengthen himself by procuring assistance from all the Saxons already in the island. He then advanced against the Britons, commanding the right wing himself, and his son Cenric the left. As the two armies drew near each other, Nazaleod perceived the enemy's right wing to be much stronger than the left. He therefore attacked it with the flower of his army; and after an obstinate resistance, obliged Cerdic to fly before himself by flight. Being too eager in the pursuit, however, Cenric fell upon his rear, and the battle was renewed with great vigour. The British army was at last entirely defeated; and 5000 men, among whom was Nazaleod himself, were left dead on the spot.

Who succeeded Nazaleod in the kingdom of Britain, is not known. The Welsh annals leave an interregnum of about six years; after which they place the beginning of the reign of Arthur, the most renowned British Prince mentioned in history. The history of Whether king Arthur is so much obscured by fables, and many absurd, romantic, and ridiculous stories, that some have supposed that no such person ever existed. On this subject Milton gives the following reasons against the existence of king Arthur: 1. He is not mentioned by Gildas,
Gildas, or any British historian except Nennius, who is allowed on all hands to have been a very credulous writer, and to have published a great many fables. 2. Though William of Malmebury and Henry of Huntingdon have both related his exploits, yet the latter took all he wrote from Nennius; and the former, either from the same fabulous writer, or from Monkish legends in the abbey of Glastenbury; for both these writers flourished several centuries after King Arthur.

3. In the pretended history of Geoffrey of Monmouth, such contradictions occur concerning this monarch's victories in France, Scotland, Ireland, Norway, Italy, etc. as must cause us to look upon him as an hero altogether fabulous and romantic.

In answer to this has been said, 1. That his not being mentioned by Gildas cannot seem strange to us, seeing it was not that author's design to write an exact history of his country, but only to give a short account of the causes of its ruin by the Scots, Picts, and Saxons. He had also a particular system to support, namely, That the ruin of the Britons was owing to the judgements of God upon them for their wickedness. He lies therefore under a great temptation to conceal the successes of the Britons, and to relate only their misfortunes. 2. Though Nennius was a credulous writer, it is unreasonablc to think that the whole history of King Arthur was an invention of his. It is more probable that he copied it from other more ancient authors, or took it from the common tradition of his countrymen. That the Saxon annals make no mention of this king is not to be wondered at, seeing it is natural to think that they would wish to conceal the many defeats he gave their nation. 3. The most convincing proof of the existence of King Arthur is, that his tomb was discovered at Glastenbury in Somersetshire, and his coffin dug up, in the reign of Henry II. with the following inscription upon it in Gothic characters: "Hac jacet fæculus inexcus a rex Arturius in infinita Avalon". We are told that on his body were plainly to be seen the marks of 10 wounds, only one of which seemed to be mortal.

This renowned prince is said to have defeated the Saxons under Cerdic in 12 pitched battles. The last of these was fought on Badon-hill, supposed to be Banfildon near Bath; in which the Saxons received such a terrible overthrow, that for many years they gave the Britons no further molestation. As new supplies of Saxons, however, were continually flocking over, a third and fourth kingdom of them were soon formed. The third kingdom comprehended the counties of Devon, Dorset, Somerset, Wiltshire, Hampshire, and Berkshire; to which was afterwards added Cornwall. This was called the kingdom of the West Saxons. The other kingdom, which was called the kingdom of the East Saxons, comprehended Essex, Middlesex, and part of Hertfordshire.

In the year 542, happened the death of the great king Arthur, said to have been killed in battle by a treacherous kinsman of his own. Five years afterwards, was erected the Saxon kingdom of Northumberland. It extended, however, much farther than the present bounds of that country; for it comprehended all Yorkshire, Lancashire, Durham, Cumberland, Westmorland, and Northumberland, with part of Scotland, as far as the frith of Forth. Between these Saxons kings frequent contentions now arose; by which means the Britons enjoyed an uninterrupted tranquillity for at least 44 years. This interval, however, according to Gildas, they employed only in corrupting their manners more and more, till at last they were routed from their security by the setting up of a sixth Saxon kingdom, called the kingdom of the East Angles. It was founded in 575, and comprehended the counties of Norfolk, Suffolk, Cambridgeshire, and the Isle of Ely. The Saxons once more attacked the Britons, and overthrew them in many battles. The war was continued for ten years; after which, another Saxon kingdom called Mercia was set up. It comprehended 17 counties; viz. Gloucester, Hereford, Worcester, Warwick, Leicester, Rutland, Northampton, Lincoln, Huntington, Bedford, Buckingham, Oxford, Stafford, Nottingham, Derby, Shropshire, Cheshire, and part of Hertfordshire.

The provincial Britons were now confined within very narrow bounds. However, before they entirely gave up the last part of their country to their enemies, they once more resolved to try the event of a battle. At this time they were affid by the Angles, who were jealous of the overgrown power of the West Saxons. The battle was fought in Wiltshire, at Warden or Bear, a place near the ditch called Warwick or Westwick, which runs through the middle of the country. The battle was very obstinate and bloody; but at last the Saxons were entirely defeated, and almost their whole army cut off. The victory, however, proved of little service to the Britons: for being greatly inferior in number to the Saxons, and harassed by them on the one side, and by the Scots and Picts on the other, they were daily more and more confined; and at last obliged to take refuge among the craggy and mountainous places in the west of the island, where their enemies could not pursue them. At first they possessed all the country beyond the rivers Dee and Severn, which anciently divided Cambria, or Wales, from England; the towns which stand on the eastern banks of these rivers having mostly been built in order to restrain the incursions of the Welsh. But the English, having passed the Severn, by degrees seized on the country lying between that river and the Wye. Nay, in former time, some parts of Flintshire and Denbighshire were subject to the kings of Mercia: for Uffa, the most powerful king of that country, caused a deep ditch to be drawn, and a high wall built, as a barrier between his dominions and the territories of the Welsh, from the mouth of the Dee, a little above Flint-castle, to the mouth of the Wye. This ditch is still to be seen in several places, and is called by the Welsh Glandvll Uffa, or the Ditch of Uffa. The inhabitants of the towns on the east side of this ditch are called by the same people Caer y Mers; that is, the men of Mercia.

Thus, after a violent conflict of near 150 years, the Saxons entirely subdued the Britons whom they had come to defend, and erected seven independent kingdoms in England, now commonly denominated the Saxon Heptarchy. By these conquerors the country was now reduced to a degree of barbarity almost as great as it had been in when first invaded by the Romans. The provincial Britons, during their subjection to that people, had made considerable advances in ci-
England. They had built 28 considerable cities, besides a number of villages and country- seats; but now there were all levelled with the ground, the native inhabitants who remained in England were reduced to the most abject slavery, and every art and science totally extinguished among them.

Before the fierce conquerors could be civilized in any degree, it was necessary that all the seven kingdoms should be reduced under one head; for as long as they remained independent, their continual wars with each other still kept them in the same state of barbarity and ignorance.

The history of these seven kingdoms affords no event that can be in the least interesting. It consists only of a detail of their quarrels for the sovereignty. This was at last obtained by Egbert king of the Wessex, or Wealhseax, in 827. Before this time, Christianity had been introduced into almost all the kingdoms of the heptarchy; and however much corrupted it might be by coming through the impure channel of the church of Rome, and misunderstood through the ignorance of those who received it, it had considerably softened the barbarous manners of the Saxons. It had also opened a communication between Britain and the more polite parts of Europe, so that there was now some hope of the introduction of arts and sciences into this country. Another effect was, that, by the ridiculous notions of preserving inviolable chastity even between married people, the royal families of most of the kingdoms were totally extinct; and the people, being in a state of anarchy, were ready to submit to the first who assumed any authority over them.

All these things contributed to the successes of Egbert in uniting the heptarchy under his own dominion. He was of the royal family of Wealhseax; and a nearer heir than Britthric, who had been raised to the kingdom in 784. As Egbert was a prince of great accomplishments, Britthric, knowing that he had a better title to the crown than himself, began to look upon him with a very jealous eye. Young Egbert, sensible of his danger, privately withdrew to France; where he was well received by Charlemagne, the reigning monarch. The French were reckoned at this period the most valiant and polite people in Europe; so that this exile proved of great service to Egbert.

He continued at the court of France till he was recalled by the nobility to take possession of the kingdom of Wealhseax. This recall was occasioned by the following accident. Britthric the king of Wealhseax had married Eadburga, natural daughter of Offa king of Mercia; a woman infamous for cruelty and incontinence. Having great influence over her husband, she often persuaded him to destroy those of the nobility as were obnoxious to her; and where this expedient failed, she herself had not scrupled to become their executioner. She had mixed a cup of poison for a young nobleman, who had acquired a great share of her husband's friendship: but, unfortunately, the king drank of the fatal potion along with his favourite, and soon after expired. By this and other crimes Eadburga became odious to the people, that she was forced to fly into France, whereas Egbert was at the same time recalled, as abovementioned.

Egbert ascended the throne of Wealhseax in the year 799. He was the sole descendant of those conquerors who first invaded Britain, and who derived their pedigree from the god Woden. But though this circumstance might have given him great advantages in attempting to subdue the neighbouring kingdoms, Egbert for some time gave them no disturbance; but turned his arms against the Brittons, who had retired into Cornwall, whom he defeated in several battles. He was recalled from his conquests in that country, by hearing that Bernulf king of Mercia had invaded his dominions. Egbert quickly led his army against the invaders, whom he totally defeated at Kilendun in Wilshire. He then entered their kingdom on the side of Oxfordshire, with an army, and at the same time sent his eldest son Ethelwulf with another into Kent. The young prince expelled Baldred the tributary king of Kent, and soon made himself master of the country. The kingdom of Essex was conquered with equal ease; and the East Angles, who had been reduced under subjection by the Mercians, joyfully put themselves under the protection of Egbert. Bernulf himself marched against them, but was defeated and killed; and Ludecan his successor met with the same fate two years after.

These misfortunes greatly facilitated the reduction of Mercia. Egbert soon penetrated into the very heart of the Mercian territories, and gained an easy victory over a dispirited and divided people; but in order to engage them to submit with the least reluctance, he allowed Wiglaf, their countryman, to retain the title of king, whilst he himself exercised the real power of a sovereign. Northumberland was at present in a state of anarchy; and this tempted Egbert to carry his victorious arms into that kingdom also. The inhabitants, being defirous of living under a settled form of government, readily submitted, and owned him for their sovereign. To them, however, he likewise allowed the power of electing a king; who paid him a tribute, and was dependent on him.

Egbert became sole master of England about the year 827. A favourite opportunity was now offered to the Anglo-Saxons of becoming a civilized people, as they were at peace among themselves, and seemed free from any danger of a foreign invasion. But this flattering prospect was soon overcast. Five years after Egbert had established his new monarchy, the Danes landed in the Isle of Shepey, plundered it, and then made their escape with safety. Encouraged by this success, next year they landed from a fleet of 35 ships. They were encountered by Egbert at Charmouth in Dorsetshire. The battle was obstinate and bloody; but the numbers of the Danes were killed, but the rest made good their retreat to their ships. They next entered into an alliance with the Brittons of Cornwall; and landing two years after in that country, they made an irritation into Devonshire. Egbert met them at Hengeldown, and totally defeated them; but before he had time to form any regular plan for the defence of the kingdom, he died, and left the government to his son Ethelwulf.

The new king was weak and superstitious. He began with dividing the kingdom, which had lately been united, with his son Athelstan. To the young prince he gave the counties of Essex, Kent, and Sussex. But though this division might have been productive
of bad consequences at another time, the fear of
the Danes kept every thing quiet for the present. These
barbarians had some how or other conceived such hopes
of enriching themselves by the plunder of England,
that they feared ever failing of paying it an annual visit.
The English historians tell us, that they met with many
severe repulses and defeats; but on the whole it
appears that they had gained ground: for in 831 a
body of them took up their winter-quarters in Eng-
land. Next year they received a strong reinforcement
of the Danes, who appointed their master, and advancing
on the Isle of Thanet, where they had stationed them-
thes, they burnt the cities of London and Canter-
bury. Having next put to flight Brichtric the gov-
ernor of Mercia, they marched into the heart of Sur-
ry, laying waste the whole country through which
they passed.

Elthelwolf, though naturally little fitted for military
enterprises, was now obliged to take the field. He
marched against the Danes at the head of the West-
Saxons, and gained an indecisive and bloody victory
over his enemies. The Danes still maintained their
settlement in the Isle of Thanet. They were attacked
by Ealhere and Huda, governors of Kent and Surrey;
both of whom they defeated and killed. Afterwards
they removed to the

The deplorable

The event

Edward, who may properly be called the founder of Alfred the
the English monarchy, ascended the throne in the year Great
871, being then only 22 years of age. His great vir-
tues and shining talents saved his country from ruin,
which seemed almost unavoidable. His exploits against
the Danes, his dangers and difficulties, are related under
the article Alfred. Having settled the nation in a
much better manner than could have been expected, he
died in 901, leaving the kingdom to his second son
Edward the Elder.

The beginning of this monarch's reign was disturbed by
those intestine commotions from which the wife and
political Alfred had taken so much pains to free the
nation. Ethelwold, son to king Ethelbert, Alfred's el-
der brother, claimed a right to the throne. Having
armed his partisans, he took possession of Winburne,
where he seemed determined to hold out to the last
 extremity. On the approach of Edward, however,
with a powerful army, he first fled into Normandy, and
afterwards into Northumberland. He hoped to find
the Northumbrians ready to join him, as most of them
were Danes, lately subdued by Alfred, and very in-
patient of peace. The event did not disappoint his ex-
pectations.
England.

The Northumbrians declared for him; and Ethelwald having thus connected himself with the Danish vrijder, went beyond sea, whence he returned with a great body of their banditti. On his return, he was joined by the Danes of East Anglia and Mercia. Ethelwald, at the head of the rebels, made an irruption into the counties of Gloucester, Oxford, and Wilt; and having ravaged the country, retired with his booty before the king could approach him. Edward, however, took care to revenge himself, by conducting his forces into East Anglia, and ravaging it in like manner. He then gave orders to retire; but the Kentish men, greedy of more plunder, halted behind, and took up their quarters at Bury. Here they were assaulted by the Danes; but the Kentishmen made such an obstinate defence, that though their enemies gained the victory, it was bought by the loss of their bravest men, and, among the rest, of the usurper Ethelwald himself.

The king, now freed from the attempts of so dangerous a rival, concluded an advantageous peace with the East Angles. He next set about reducing the Northumbrians; and for this purpose equipped a fleet, hoping that thus they would be induced to remain at home to defend their own country, without attempting to invade his territories. He was disappointed in his expectations. The Northumbrians were more eager to plunder their neighbours than to secure themselves. Imagining that the whole of Edward's forces were embarked on board his fleet, they entered his territories with all the troops they could raise. The king, however, was better prepared for them than they had expected. He attacked them on their return at Tettenhall in the county of Stafford, put them to flight, recovered all the booty, and pursued them with great slaughter into their own country.

The rest of Edward's reign was a scene of continued and successful action against the Northumbrians, East Angles, the Danes of Mercia, and those who came from their native country in order to invade England. He put his kingdom in a good posture of defence, by fortifying the towns of Chester, Eddesbury, Warwick, Cherbury, Buckingham, Towcester, Maldon, Huntingdon, and Colchester. He vanquished Turkettill a Danish chiefman, and obliged him to retire with his followers into France. He subdued the east Anglians, Northumbrians, and several tribes of the Britons; and even obliged the Scots to make submissions. He died in 925, and was succeeded by Athelstan his natural son.

This prince, notwithstanding his illegitimate birth, ascended the throne without much opposition, as the legitimate children of Edward were too young to rule a nation so much liable to foreign invasions and domestic troubles as England at present was. One Alfred, however, a nobleman of considerable power, entered into a conspiracy against him. It is said, that this nobleman was seized upon strong suspicions, but without any certain proof. He offered to swear to his innocence before the pope; and in those ages it was supposed that none could take a false oath in presence of such a facted person, without being visited by an immediate judgment from God. He was accordingly conducted to Rome, and took the oath required of him before Pope John. The words were no sooner pronounced, than he fell into convulsions, of which he expired in three days. The king, fully convinced of his guilt, confiscated his estate, and made a present of it to the monastery of Malmesbury.

This accident proved the means of establishing the authority of Athelstan in England. But finding the Northumbrians bore the English yoke with impatience, he gave Sithrie, a Danish nobleman, the title of king of Northumberland; and in order to secure his friendship, gave him his own sister Editha in marriage. This was productive of bad consequences. Sithrie died the year after his marriage with Editha; upon which Anlaf and Godfrid, Sithrie's sons by a former marriage, assumed the sovereignty without waiting for Athelstan's consent. They were, however, soon obliged to yield to the superior power of that monarch. The former fled to Ireland; and the latter to Scotland, where he was protected by Constance, king of that country. The Scotch monarch was continually importuned by Athelstan to deliver up his guest, and even threatened with an invasion in case he did not comply. Constance, detesting this treachery, advised Godfrid to make his escape. He did so, turned pirate, and died soon after. Athelstan, however, resenting this conduct of Constance, invaded his kingdom, and reduced him; it is said, to what low degree he was obliged to make the most horrid submissions. This, however, is denied by all the Scotch historians.

Constance, after the departure of Athelstan, entered into a confederacy with Anlaf, who subsisted by his piracies, and with some of the Wett princes who were alarmed at the increase of Athelstan's power. All these his confederates made an irruption into England at once; but Athelstan meeting them at Brum bury in Northumberland, gave them a total overthrow. Anlaf and Constance made their escape with difficulty, leaving the greatest part of their men dead on the field of battle. After this period, Athelstan enjoyed his crown in tranquillity. He died in 944, after a reign of 16 years. He piled a remarkable law, for the encouragement of commerce; viz. that a merchant, who had made three long sea-voyages on his own account, should be admitted to the rank of a thane or gentleman.

Athelstan was succeeded by his brother Edmund. On his accession, he found the kingdom disturbed by the rebellious Northumbrians, who watched for every opportunity of rising in rebellion. They were, however, soon reduced; and Edmund took care to ensure the peace of the kingdom, by removing the Danes from the towns of Mercia where they had been allowed to settle, because it was found that they took every opportunity to introduce foreign Danes into the kingdom. He also conquered Cumberland from the Britons. This country, however, be bequeathed upon Malmotk king of Scotland, upon condition that he should do homage for it, and protect the north of England from all future incursions of the Danes.

Edmund was unfortunately murdered in Gloucester. He was murdered by one Leof, a notorious robber. This man had been by Leof, formerly sentenced to banishment; yet had the boldnesse to enter the hall where the king himself dined, and set at table with his attendants. Edmund immediately ordered him to leave the room. The villain refused to obey; upon which the king leaped upon him.
him, and seized him by the hair. Leolf then drew a dagger, and gave the king a wound, of which he
infantly died, A. D. 946, being the sixth year of his
reign.

As the children of Edmund were too young at the
time of his decease, his brother Edred succeeded to the
throne. The beginning of his reign, as well as those
of his predecessors, was disturbed by the rebellions and
incursions of the Northumbrian Danes, who looked
upon the deposition of every new king to be a favourable
opportunity for shaking off the English yoke. On
the appearance of Edred with an army, however, they
immediately submitted; but before the king withdrew
his forces, he laid waste their territories as a punish-
ment for their offence. He was no sooner gone, than
they rose in rebellion a second time. They were again
subdued; and the king took effectual precautions aga-
inst their future revolts, by placing English garri-
sions in all their towns, and appointing an English go-
 vernor to watch their motions, and suppress their in-
surrections on the first appearance. In the reign of
Edred, celibacy of the clergy began to be preached
up under the patronage of St Dunstan. This man
had obtained such an ascendant over Edred, who was
naturally superstitious, that he not only directed him in
affairs of confidence, but in the most important mat-
ers of state. He was placed at the head of the trea-
sury; and being thus possessed of great power at court,
he was enabled to accomplish the most arduous under-
takings. He professed himself a partizan of the rigid
monastic rules; and having introduced celibacy among
the monks of Glastonbury and Abingdon, he endeav-
oured to render it universal among the clergy through-
out the kingdom. The monks in a short time gene-
 rally embraced the pretended reformation; after which
they inveighed bitterly against the vices and luxury of
the age. When other topics of sedition were want-
ing, the marriages of clergymen became a focre object
of invective. Their wives received the appellation of
concubines or some other more opprobrious name.
The secular clergy, on the other hand, who were num-
 erous and rich, defended themselves with vigour, and
developed to retaliate upon their adversaries. The
people were thrown into the most violent ferment;
but the monks, being patronized by king Edred, gain-
ed ground greatly upon their opponents. Their pro-
gress, however, was somewhat retarded by the king's
death, which happened in 955, after a reign of nine
years. He left children; but as they were infants, his
nephew Edwy, son to Edmund, was placed on the
throne.

The new king was not above 16 or 17 years of age at
the time of his accession. His reign is only remark-
able for the tragical story of his queen Elgiva. She
was a princess of the royal blood, with whom Edwy was
deeply enamoured. She was his second or third
consort, and therefore within the degrees of affinity
prohibited by the canon law. Edwy, however, hear-
tkening only to the dictates of his passion, married her,
contrary to the advice of the more dignified ecclesiastics.
The monks on this occasion were particularly violent;
and therefore Edwy determined not to second their
ambitious projects. He soon found reason to repent
his having provoked such dangerous enemies. On his
coronation day, while his nobility were indulging them-

The

Edwy
The greatness of king Edgar, which is very much celebrated by the English historians, was owing to the harmony which reigned between him and his subjects; and the reason of this good agreement was, that the king sided with Dunstan and the monks, who had acquired a great ascendant over the people. He enabled them to accomplish their favourite scheme of dispossessing the secular canons of all the monasteries; and he consulted them not only in ecclesiastical, but also in civil affairs. On these accounts, he is celebrated by the monkish writers with the highest praisings; though at his court and throughout the kingdom, he was, however, not to be satisfied with one advantageous match; and therefore, if the king gave his assent to their wishes, he was, on some pretence or other, to be prevented from marrying her. He communi-

His licence, or amour, obliged the king, not to separate from his mistress, but to abstain from wearing his crown for seven years! Edgar, however, was not to be satisfied with one mistress. He happened once to lodge at the house of a nobleman who had a very beautiful daughter. Edgar, enamoured with desire at the sight of the young lady, without ceremony asked her mother to allow her to pass a night with him. She promised compliance; but secretly ordered a waiting-maid, named Elfrida, to steal into the king's bed when the company were gone, and to retire before day-break. Edgar, however, detained her by force, till day-light discovered the deceit. His love was now transferred to the waiting-maid, who became his favourite mistress, and maintained a great ascendancy over him till his marriage with Elfrida.

The circumstances of this marriage were still more singular and criminal than those abovementioned. Elfrida was daughter and heiress to Olger Earl of Devonshire. She was a person of such exquisitely beauty, that her fame was spread all over England, though she had never been at court. Edgar's curiosity was excited by the accounts he had heard of her, and therefore formed a design of marrying her. He communicated his intentions to Earl Athelwold his favourite; and ordered him, on some pretence or other, to visit the Earl of Devonshire, and bring him a certain account concerning Elfrida. Athelwold went as he was desired; but fell so deeply in love with the lady himself, that he resolved to sacrifice his fidelity to his passion. He returned to Edgar, and told him, that Elfrida's charms were by no means extraordinary, and would have been totally overlooked in a woman of inferior station. After some time, however, turning the conversation again upon Elfrida, he told the king that he thought her parentage and fortune made her a very advantageous match; and therefore, if the king gave his consent he would make proposals to the Earl of Devonshire on his own behalf. Edgar confented, and Athelwold was married to Elfrida.—After his marriage, he used his utmost endeavours to keep his wife from court, that Edgar might have no opportunity of observing her beauty. The king, however, was soon informed of the truth; and told Athelwold that he intended to pay her a visit in his castle, and be made acquainted with his new-married wife. The Earl could make no objections; only he defined a few hours to prepare for the visit. He then confessed the whole to Elfrida, and begged of her to appear before the king as much to the disadvantage as possible. Instead of this, she defied herself to the greatest advantage. Edgar immediately conceived a violent passion for her; and, in order to gratify it, seduced Athelwold into a wood under pretence of hunting, where he stabbed him with his own hand, and afterwards married his widow.

The reign of Edgar is remarkable among historians for the encouragement he gave to foreigners to reside at his court and throughout the kingdom. These foreigners, it is said, corrupted the former simple manners of the nation. Of this simplicity, however, there seems to be no great reason to boast; seeing it could not perhaps prevent them from treachery and cruelty, the greatest of all vices: so that their acquaintance with foreigners was certainly an advantage to the people, as it tended to enlarge their views, and cure them of those illiberal prejudices and rufcic manners to which furlanders are often subject.—Another remarkable incident, is the extirpation of wolves from England. The king took great pleasure in hunting and destroying these animals himself. At last he found that they had all taken shelter in the mountains and forests of Wales. Upon this he changed the tribute imposed upon the Welsh princes by Athelstan, into an annual tribute of 300 wolves' heads; and this produced such diligence in hunting them, that the animal has never since appeared in England.

Edgar died in 957, after a reign of 16 years. He Edward the left a son named Edward, whom he had by his first wife, the daughter of Earl Ordmer; and another, named Ethelred, by Elfrida. The mental qualifications of this lady were by no means answerable to the beauty of her person. She was ambitious, haughty, treacherous, and cruel. The principal nobility, therefore, were greatly averse from the succession of her son Ethelred, which would unavoidably throw too much power into the hands of his mother, as he himself was only seven years of age. Edward, afterwards furnished the Murphys, was therefore pitched upon; and was certainly the most proper person as he was 15 years of age, and might soon be able to take the government into his own hands. Elfrida opposed his advancement with all her might: but Dunstan overcame every obstacle, by anointing and crowning the young prince at Kingston; upon which the whole kingdom submitted without farther opposition.

The only remarkable occurrence in this reign was the complete victory gained by the monks over the secular clergy, who were now totally expelled from the convents. Though this had been pretty nearly accomplished by Edgar, the secular clergy still had partitions in England who made considerable opposition; but these were all silenced by the following miracles. In one synod, Dunstan, finding the majority of votes against him, rose up, and declared that he had that day infant presented from heaven a revelation in favour of the monks. The whole assembly were so much overawed by this intelligence, that they proceeded no farther in their deliberations. In another synod, a voice issued from the crucifix, accusing the members, that the establishment of the monks was founded on the will of heaven, and could not be opposed without impiety. But the third miracle was still more alarming. In another
other synod the floor of the hall sunk, and great numbers of the members were killed or bruised by their fall. It was remarked that Dunstan had that day prevented the king from attending the synod, and that the beam on which his own chair stood was the only one which did not sink. These circumstances, instead of making him suspected as the author of the miracle, were regarded as proofs of the interposition of Providence in his favour.

Edward lived four years after he was raised to the throne, in perfect innocence and simplicity. Being incapable of any treacherous intention himself, he suspected none in others. Though his stepmother had opposed his succession, he had always behaved towards her with the greatest respect; and expressed on all occasions the most tender affection for his brother Ethelred. Being one day hunting in the neighbourhood of the castle where Elfrida reided, he paid her a visit unattended by any of his retinue. After mounting his horse with a design to return, he desired some of the castle to be brought him. But while he was holding the cup to his head, a servant of Elfrida flabb'd him behind. The king finding himself wounded, clapped spurs to his horse; but soon becoming faint by the loss of blood, he fell from the saddle, and his foot being entangled in the stirrup, he was dragged along till he expired. His body was found and privately interred at Wreccham by his servants. The English had such compassion for this amiable prince, that they believed on him the appellation of Martyr, and even fancied that miracles were wrought at his tomb. Elfrida built monasteries, and submitted to many penances, in order to avenge her guilt; but, even in that barbarous age, she could never regain the good opinion of the public.

After the murder of Edward, his brother Ethelred succeeded to the throne without opposition. As he was a minor when he was raised to the throne, and, even when he came to man's estate, never discovered any vigour or capacity of defending the kingdom against invaders, the Danes began to renew their incursions. Before they withdrew attempts of any importance, however, they first made a small incursion by way of trial. In the year 961, they landed in Southampton from seven vessels; and having ravaged the country, they retired in impetuosity, carrying a great booty along with them. In 687, they made a similar attempt on the west coast, and were attended with the like success. Finding that matters were now in a favourable situation for their enterprises, they landed in Essex under the command of two chieftains; and, having defeated and killed Brithnoth duke of that country, laid waste all the neighbouring provinces. In this extremity, Ethelred, surnamed, on account of his prodigious conduct, the Unready, bribed the enemy with L.10,000 to depart the kingdom. This advance was given by Sirecius archbishop of Canterbury, and some of the degenerate nobility; and was attended with the success that might have been expected. The Danes appeared the next year off the eastern coast. But, in the mean time, the English had determined to assemble at London a fleet capable of repulsing the enemy. This failed of success through the treachery of Alfric Duke of Mercia. Having been formerly banished the kingdom, and found great difficulty in getting himself restored to his former dignity, he trusted thenceforth, not to his services or the affections of his countrymen, but to the influence he had over his subjects, and to the public calamities. These last he determined always to promote as far as he could; because in every revolution his assistance would be necessary, and consequently he must receive continual accession of power. The English had formed a plan for surrounding and destroying the Danish fleet in the harbour; but Alfric not only gave the enemy notice of this design, but also deferred with his squadron the night before the engagement. The English by this means proved unsuccessful; and Ethelred, in revenge, took Alfric, Alfric's son, and ordered his eyes to be put out. This piece of cruelty might have been productive of no good effect. Alfric had become so powerful, that notwithstanding his treachery, it was found impossible to deprive him of the government of Mercia.

In 993, the Danes under the command of Swyn their king, and the Norwegians conducted by Olave king of that country, failed up the Humber, and destroyed all around them. A powerful army was assembled to oppose these invaders; but through the treachery of the three leaders, all men of Danish extraction, the English were totally defeated. Encouraged by this success, the Danes entered the Thames in 94 vessels, and laid siege to London. The inhabitants, however, made such a brave defence, that the besiegers were finally obliged to give over the attempt. Out of revenge for this disappointment, they laid waste Essex, Suffex, and Hampshire. In these counties they procured horses; by which means they were enabled to penetrate into the more inland parts, and threatened the kingdom with total subjection. Ethelred and his nobles had now recourse to their former expedient. They sent ambassadors to the two northern kings, to whom they promised subsistence and tribute, provided they would, for the present, put an end to their ravages, and soon after depart the kingdom. They agreed to the terms, and peaceably took up their quarters at Southampton. Olave even paid a visit to Ethelred, and received the rites of confirmation from the English bishops. The king also made him many presents; and Olave promised never more to infest the English territories; which promise it is said he afterwards religiously observed.

After the departure of Olave, with his Norwegians, though less formidable than the king of Norway, was obliged to leave the kingdom also. But this shameful composition procured only a short relief to the nation. The Danes soon after appeared in the Severn; and having ravaged Wales as well as Cornwall and Devon, they sailed round, and, entering the mouth of the Tamar, completed the ruin of these two countries. Then, returning to the Bristol channel, and penetrating into the country by the Avon, they over-ran all that country, and carried fire and sword even into Dorsetshire. In 998, they changed the seat of war; and, after ravaging the Isle of Wight, they entered the Thames and Medway, where they laid siege to Rochester, and defeated the Kentish men in a great battle. After this victory, the whole province of Kent was made a scene of slaughter and devastation. The extremity of these miseries forced the English into councils for common defence both by sea and land; but the weakness of the king, the divisions among the nobility, the treachery of some, the cowardice of others, the
England. the want of concert in all, frustrated every endeavour; and their fleets and armies either came too late to attack the enemy, or were repulsed with dishonour. The English, therefore, devoid both of prudence and unanimity in council, had recourse to the expedients which by experience they had found to be ineffectual. They offered the Danes a large sum if they would conclude a peace and depart the kingdom. These ravagers continually rove in their demands; and now required the payment of L.24,000, which the English submitted to give. The departure of the Danes procured them a temporary relief; which they enjoyed as if it was to be perpetual, without making any effectual preparations for giving them a more vigorous reception upon their next return.

Besides the receiving this sum, the Danes were at present engaged by another motive to depart from England. They were invited over by their countrymen in Normandy, who at this time were hard pressed by Robert king of France, and who found it difficult to defend their settlements against him. It is probable also, that Ethelred, observing the close connection of all the Danes with one another, however they might be divided in government or situation, was desirous of procuring an alliance with that formidable people. For this purpose, being at present a widower, he made his addresses to Emma, sister to Richard II. Duke of Normandy. He soon succeeded in his negotiations; the princes came over to England, and was married to the king in the year 1001.

Though the Danes had been for a long time established in England, and though the similarity of their language with the Saxon had invited them to an early coalition with the natives; they had as yet found too little example of civilized manners among the English, that they retained all their ancient ferocity, and valued themselves only on their national character of military bravery. The English princes had been so well acquainted with their superiority in this respect, that Aethelston and Edgar had been accustomed to keep in pay large bodies of Danish troops, who were quartered about the country, and committed many violences upon the inhabitants. These mercenary expeditions had attained to such an height in luxury, according to the old English writers, that they combed their hair once a day, bathed themselves once a-week, changed their clothes frequently; and by these arts of effeminacy, as well as by their military character, had rendered themselves so agreeable to the fair sex, that they debauched the wives and daughters of the English, and dishonoured many families. But what most provoked the inhabitants was, that, instead of defending them against invaders, they were always ready to betray them to the foreign Danes, and to associate themselves with every fragging party which came from that nation.

The animosities between the native English and the Danes who had inhabited among them, had from these causes risen to a great height; when Ethelred, from a policy commonly adopted by weak princes, took the cruel resolution of murthering the Danes throughout the kingdom. On the 13th of November 1002, secret orders were dispatched to commence the execution everywhere on the same day; and the festival of St Brice, which fell on a Sunday, the day on which the Danes usually bathed themselves, was chosen for this purpose. These cruel orders were executed with the utmost exactness. No distinction was made between the innocent and the guilty; neither sex nor age was spared; nor were the cruel executioners satisfied without the tortures as well as death, of the unhappy victims. Even Gunilda, sister to the king of Denmark, who had married Earl Paling, and had embraced Christianity, was, by the advice of Edric Earl of Wilts, seized and condemned to death by Ethelred, after seeing her husband and children butchered before her face. This unhappy princes foretold, in the agonies of despair, that her murder would soon be avenged by the total ruin of the English nation (A).

The prophecy of Gunilda was exactly fulfilled. In New invasion, 1093, Sweyn and his Danes, who wanted only a pretence to renew their invasions, appeared off the western coast, and threatened revenge for the slaughter of their countrymen. The English took measures for repulsing the enemy; but these were defeated thro' the treachery first of Alfrie; and then of Edric, a still greater traitor, who had married the king's daughter, and succeeded Alfrie in the command of the Danish armies. The Danes therefore ravaged the whole country. Agriculture was neglected, a famine ensued, and the kingdom was reduced to the utmost degree of misery. At last the infamous expedient of buying a peace was resorted to; and the departure of the Danes was purchased in 1007, at the expense of L.30,000.

The English endeavoured to employ this interval in making preparations against the return of the Danes, which they had reason soon to expect. A law was made, ordering the proprietors of eight hides of land to provide themselves of a borseman and a complete suit of armour; and those of 210 hides to equip a ship for the defence of the kingdom. By this means a formidable armament was raised. There were 243,600 hides in England; consequently the ships equipped must be 785. The cavalry was 30,450 men. All hopes of success from this equipment, however, were disappointed by the factions, animosities, and divisions among the people. (A) On the subject of this massacre, Mr Hume has the following observations: "Almost all the ancient historians speak of this massacre of the Danes as if it had been universal, and as if every individual of that nation throughout England had been put to death. But the Danes were almost the sole inhabitants of the kingdoms of Northumberland and East Anglia, and were very numerous in Mercia. This representation of the matter was absolutely impossible. Great reluctance must have been made, and violent wars ensued; which was not the case. This account given by Wallingford, though he stands single, must be admitted as the only true one. We are told that the name of medieval, lord Dane, for an idle lazy fellow who lives at other people's expense, came from the conduct of the Danes who were put to death. But the English princes had been entirely masters for several generations; and only supported a military corps of that nation. It seems probable, therefore, that these Danes only were put to death."
Brightrige to advance an accusation of treason against Wolfnoth, governor of Suffolk, the father of the famous Earl Godwin; and that nobleman, knowing the power and malice of his enemy, confided his own safety by defecting with 20 ships to the Danes. Brightrige pursued him with a fleet of 80 sail; but his ships being shattered in a tempest, and stranded on the coast, he was suddenly attacked by Wolfnoth, and all his vessels were burnt or otherwise destroyed. The treachery of Edric frustrated every plan of future defence; and the whole navy was at last scattered into the several harbours.

By these fatal miscarriages, the enemy had leisure to over-run the whole kingdom. They had now got such a footing, indeed, that they could hardly have been expelled though the nation had been ever so unanimous. But so far did mutual difference and dissention prevail, that the governors of one province refused to march to the assistance of another; and were at last terrified from assembling their forces for the defence of their own. At last the usual expedition was tried. A peace was bought with £48,000; but this did not procure even the usual temporary relief. The Danes, knowing that they were now masters of the kingdom, took the money, and continued their devastations. They levied a new contribution of £8000 on the county of Kent alone; murdered the archbishop of Canterbury, who had refused to countenance this exaction; and the English nobility submitted every where to the Danish monarch, withholding allegiance to him, and giving hostages for their good behaviour. At last, Etheldred himself, dreading equally the violence of the enemy and the treachery of his own subjects, fled into Normandy, whither he had already sent queen Emma and her two sons Alfred and Edward. The Duke received his unhappy guest with a generosity which does honour to his memory.

The flight of king Ethelred happened in the end of the year 1013. He had not been above six weeks in Normandy, when he heard of the death of Swynn, which happened at Gainborough before he had time to establish himself in his new dominions. At the same time he received an invitation from the prelates and nobility to resume the kingdom; expressing also their hopes, that, being now better taught by experience, he would avoid the errors which had been so fatal to himself and his people. But the misconduct of Ethelred was incurable; and, on his resuming the government, he behaved in the very manner that he had done before. His son-in-law Edric, notwithstanding his repeated treasuries, retained such influence at court, that he infilled into the king, jealousies of Sigefred and Morcar, two of the chief nobles of Mercia. Edric enticed them into his house, where he murdered them; and Ethelred parcoek of the Infamy of this action, by confiscating their estates, and confining the widow of Sigefred in a convent. She was a woman of singular beauty and merit; and in a visit which was paid her during her confinement, by prince Edmund the king's eldest son, she inspired him with so violent an affection, that he released her from the convent, and soon after married her without his father's consent.

In the mean time, Canute, the son and successor of Swynn, proved an enemy no less terrible to the English than his father had been. He ravaged the eastern coast with merciless fury; and put ashore all the English hostages at Sandwich, after having cut off their hands and noses. He was at last obliged, by the necessities of his affairs, to return to Denmark. In a short time, however, he returned and continued his depredations along the southern coast. He then broke into the counties of Dorset, Wilts, and Somerset; where an army was assembled against him under the command of Prince Edmund and Duke Edric. The latter still continued his perdition machinations; and, after endeavouring in vain to get the prince into his power, found means to displace the army, and then deferted to Canute with 40 vessels.

Edmund was not disheartened by this treachery. He again assembled his forces, and was in a condition to give the enemy battle. Etheldred, however, had now such frequent experience of the treachery of his subjects, that he had lost all confidence in them. He remained in London, pretending sickness, but in reality from an apprehension that they intended to buy their peace by delivering him into the hands of his enemies. The army called aloud for their sovereign to march at their head against the Danes; and on his refusal to take the field, they were so discouraged, that all the preparations which had been made became ineffectual for the defence of the kingdom. Edmund, deprived of all regular resources for the maintenance of the soldiers, was obliged to commit familiar ravages to thine practised by the Danes; and after making some fruitless expeditions in the north, which had submitted entirely to Canute's power, he returned to London, where he found every thing in confusion by the death of the king.

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Edmund, furnamed Ironside on account of his great strength and valour. He possessed abilities sufficient to have saved his country from ruin, had he come sooner to the throne; but it was now too late. He bravely opposed the Danes, however, notwithstanding every disadvantage; till at last the nobility of both nations agreed to make their kings to come to a compromise, and divide the kingdom between them by treaty. Edmund preserved to himself Mercia, East Anglia, and Northumberland, which he had entirely subdued. The southern parts were left to Edmund. This prince survived the treaty only about a month; being murdered at Oxford by two of his chamberlains, accomplices of Edric.

After the death of Edmund, nothing was left for Canute. The least ferulent of mankind, however, dare not at all times openly commit injustice. Canute, therefore, before he seized the dominions of Edwin and Edward, the two sons of Edmund, forbore some of the nobility to depose that, in the last treaty with Edmund, it had been verbally agreed, that, in case of Edmund's death, Canute should either be successor to his dominions, or tutor to his children; for historians differ with regard to this particular. This evidence, supported by the great power of Canute, was sufficient to get him elected king of England. Immediately after his accession to the throne, he sent the two sons of Edmund to the court of Sweden, on preface of being there educated; but

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Marries
Ethelred's
widow.

Canute was obliged at first to make great concessions to the nobility: but he afterwards put to death many of those in whom he could not put confidence; and, among the rest, the traitor Edwin himself, who was publicly executed, and his body thrown into the Thames. In order to prevent any danger from the Normans, who had threatened him with an invasion, he married Emma, the widow of Ethelred, and who now came over from Normandy; promising that he would leave the children he should have by that marriage heirs to the crown after his decease. The English were at first displeased with Emma for marrying the mortal enemy of her former husband; but at the same time were glad to find a sovereign to whom they were accustomed, and who had already formed connections with them; and thus Canute, besides securing by his marriage the alliance with Normandy, gradually acquired by the same means the confidence of his own people.

The most remarkable transgression in this prince's reign, besides those mentioned under the article Canute, is his expeditions to Scotland against Malcolm king of that country, whom he forced to do homage for the county of Cumberland, which the Scots at that time possessed. After this enterprise, Canute passed four years in peace, and died at Shiffbury; leaving three sons, Sweyn, Harold, and Hardicanute. Sweyn, whom he had by his first marriage with Alfwen, daughter of the earl of Hampshire, was crowned in Norway; Hardicanute, whom Emma had borne, was in possession of Denmark; and Harold, who was of the same marriage with Sweyn, was at that time in England.

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Harold.

Harold succeeded to the crown of England; though it had been stipulated that Emma's son, Hardicanute, should be heir to that kingdom. This advantage Harold obtained by being on the spot, and getting possession of his father's treasures, while Hardicanute was at a distance. As Hardicanute, however, was supported by earl Godwin, a civil war was likely to ensue, when a compromise was made: by which it was agreed, that Harold should enjoy London, and all the provinces north of the Thames, while the possession of the south should remain to Hardicanute: and till that prince should appear and take possession of his dominions, Emma fixed her residence at Winchester, and ruled her son's part. Harold reigned four years; during which time, the only memorable act he performed was a most infamous piece of treachery.—Alfred and Edward, the two sons of Emma by Ethelred, paid a visit to their mother in England. But, in the mean time, earl Godwin being gained over by Harold, a plan was laid for the defection of the two princes. Alfred was accordingly invited to London by Harold, with many professions of friendship; but when he had reached Guildford, he was set upon by Godwin's retainers: about 600 of his train were murdered in the most cruel manner; he himself was taken prisoner, his eyes were put out, and he was conducted to the monastery of Ely, where he died soon after. Edward and Emma, apprised of the fate which awaited them, fled beyond sea, the former into Normandy, the latter into Flanders; while Harold took possession of all his brother's dominions without opposition.—He died in April 1039.

Hardicanute succeeded his brother Harold without opposition. His government was extremely violent and tyrannical. However, it was but for a short duration. He died, in 1043, of a debauch at the marriage of a Danish lord. After his death, a favourable opportunity was offered to the English for shaking off the Danish yoke. Sweyn, king of Norway, the eldest son of Canute, was absent; and as the two last kings had died without issue, there appeared none of that race whom the Danes could support as successor to the throne. For this reason, the eyes of the nation were naturally drawn towards prince Edward, who happened to be at court when the king died. There were some reasons, however, to fear, that Edward's succession would be opposed by earl Godwin, who was by far the most powerful nobleman in the kingdom. A declared animosity subsisted between Edward and Godwin, on account of the hand which the latter had in the murder of his brother Alfred; and this was thought to be an offence of so grievous a nature, that Edward could never forgive it. But here their common friends interposed; and representing the necessity of their good correspondence, obliged them to lay aside their animosities, and to concur in restoring liberty to their native country. Godwin only stipulated that Edward, as a pledge of his sincere reconciliation, should promise to marry his daughter Editha. This proposal was agreed to; Edward was crowned king of England, and married Editha as he had promised. The marriage, however, proved rather a source of discord than otherwise between the king and Godwin. Editha, though a very amiable woman could never obtain the confidence and affection of her husband. It is even said, that, during the whole course of her life, he abstained from all matrimonial converse with her; and this ridiculous behaviour was highly celebrated by the monkish writers of the age, and contributed to the king's acquiring the title of Saint and Confessor.

Though the neglect of his daughter could not fail to awaken Godwin's former enmity against king Edward, it was necessary to choose a more popular ground before he could vent his complaints against the king in a public manner. He therefore chose for his theme the influence which the Normans had on the affairs of the kingdom; and a declared opposition took place between him and these favourites. In a short time, this animosity openly broke out with great violence. Eustace, count of Bologue having paid a visit to the king, pursued by Dover on his return. One of his train being refused access to a lodging which had been appointed for him, attempted to make his way by force, and wounded the mayor of the town by the sword.

The townspeople resented this insult by the death of the stranger; the count and his train took arms, and mar
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Edward perceived his danger applied to Siward duke of Northumberland, and Leofric duke of Mercia, two very powerful noblemen. They hastened to him with such followers as they could assemble, issuing orders at the same time for all the forces under their respective governments to march without delay to the defence of the king. Godwin, in the mean time suffered himself to be deceived by negotiations, till the king’s army became so powerful, that he was not able to cope with it. He was therefore obliged to fly with his family to Flanders. Here he was protected by Baldwin earl of that country, together with his three sons Guth, Sweyn, and Tolfi; the last of whom had married Baldwin’s daughter. Harold and Leofwin, two other sons of Godwin, took shelter in Ireland.

After the flight of earl Godwin, he was proceeded against as a traitor by king Edward. His estates, and those of his sons, were confiscated; his governments given to others: queen Editha was confined in a monastery; and the great power of this family, which had become formidable to the crown itself, feemed to be totally overthrown. Godwin, however, soon found means to retrieve his affairs. Having hired some ships, and manned them with his followers, he attempted to make a descent at Sandwich. The king, informed of his preparations, equipped a fleet which Godwin could not resist, and he therefore retreated into the Flemish harbours. On his departure, the English dismiffed their armament. This Godwin had expected, and therefore kept himself in readiness for the favourable opportunity. He immediately put to sea, and failed to the life of Wight, where he was joined by Harold with a squadron which he had collected in Ireland. Being thus master of the sea, Godwin entered the harbours on the southern coast, seized all the ships; and being joined by great numbers of his former valets, he felled up the Thames, and appeared before London.

The approach of such a formidable enemy threw everything into confusion. The king alone seemed resolute to defend himself to the last extremity; but the interposition of many of the nobility, together with the submissions of Godwin himself, at last produced an accommodation. It was stipulated, that Godwin should give hostages for his good behaviour, and that all the foreigners should be banished the kingdom; after which, Edward, sensible that he had not power sufficient to detain the earl’s hostages in England, sent them over to his kinman the young duke of Normandy.

Soon after his reconciliation, Godwin died as he was sitting at table with the king. He was succeeded in the government of Wiltshire, Sussex, Kent, and to the Eads, and in the office of steward of the household; a throne, a place of great power, by his son Harold. The son was no less ambitious than his father had been; and as he was a man of much greater abilities, he became a more dangerous enemy to Edward than even Godwin had been. Edward knew no better expedient to prevent the increas of Harold’s power, than by giving him a rival. This was Algar son of Leofric duke of Mercla, whom he invested with the government of East Anglia, which had formerly belonged to Harold. The latter, however, after some trials, finally got the better of his rival, and banished him the kingdom. Algar returned soon after with an army of Norwegians, with whom he invaded East Anglia; but his death in a short time freed Harold from all further apprehensions from that quarter. His power was still further increased in a short time after by the accession of his brother Tolfi to the government of Northumberland: and Edward now declining in years, and apprehensive that Harold would attempt to usurp the crown after his death, resolved to appoint a successor. He therefore sent a deputation into Hungary, to invite over his nephew, Edward, son to his elder brother, who was the only remaining heir of the Saxon line. That prince accordingly came over with his children, Edgar Atheling, Margaret, and Christina; but died a few days after his arrival. His death threw the king into greater perplexity than ever. Being resolved to exclude Harold if possible, he secretly cast his eye on his kinsman William Duke of Normandy; a person of whole power, character, and capacity, he had justly a very high opinion. This advice had formerly been given him by Robert archbishop of Canterbury, who was himself a Norman, and had been banished along with the rest upon the return of earl Godwin. But Edward finding that the English would more easily acquiesce in the restoration of the Saxon line, had in the mean time invited his brother’s descendants from Hungary as already mentioned. The death of his nephew, and the inexperience and unpromising qualities of young Edgar, made him refuse his former intentions in favour of the duke of Normandy, though his aversion to hazardous enterprises engaged him to postpone the execution, and even to keep his purpose concealed from all his ministers.

Harold in the mean time increased his popularity by all possible means, in order to prepare his way for being advanced to the throne after the death of Edward, which now seemed to be fast approaching. He had no suspicion of the duke of Normandy as a rival; but as he knew that a son and grandson of the earl Godwin were in the hands of that prince as hostages, he feared that they might be made use of as checks upon his ambition, in case he attempted afterwards to ascend the throne. He therefore prevailed upon Edward to release these hostages unconditionally; and having obtained his consent, he set out for Normandy himself, attended by a numerous retinue. He was driven by a tempest on the territory of Guy count of...
England.

Ponthieu, who detained him prisoner, and demanded an exorbitant sum for his ransom. Harold found means to acquaint William with his situation. The duke of Normandy, depriv'd of gaining Harold over to his party, commanded Guy to restore his prisoner to his liberty. Upon his Harold was immediately put into the hands of the Norman ambassador, who conducted him to Rouen. William received him with great demonstrations of respect and friendship; but soot took an opportunity of acquainting him with his pretensions to the crown of England, and asked his assent to the execution of his scheme. Harold was surpriz'd with this declaration of the duke; but being entirely in his power, he sign'd a compliance with his desires, and promised to second to the utmost of his ability the will of king Edward. William, to secure him as much as possible to his interest, promis'd him his daughter in marriage, and required him to take an oath that he would fulfill his promises. Harold readily complied; but to make the oath more binding, William privately conveyed under the altar where the oath was taken, relics of some of the most revered martyrs; and when Harold had taken the oath, he showed him the relics, and admonish'd him to observe religiously such a solemn engagement.

Harold was no sooner at liberty, than he found himself master of calamity, sufficient to excuse the breaking of his oath, which had been exceed from him, and which, if kept, might be attended with the suspicion of his country to a foreign power. He continued to practice every art to increase his popularity; and about this time, two accidents enabled him to add much to that character which he had already so well establish'd. The Welsh had for some time made incursions into the English territories, and had lately become so troublesome, that Harold thought he could not do a more acceptable piece of service to the public, than undertake an expedition against these invaders. Having therefore prepared some light armed foot to pursuie the natives into their fortresses, some cavalry to secure the open country, and a squadron of ships to attack the seacoasts, he employ'd all these forces against the enemy at once; and thus reduc'd them to such diftresses, that they were obli-ged to purchase peace by tendering their prince's head to Harold, and submitting to the government of two Welsh noblemen appointed by Edward.

The other incident was no less honourable to Harold. Tofti his brother had been created duke of Northumberland; but being of a violent tyrannical temper, had treat'd the inhabitants with such cruelty, that they rose in rebellion against him, and drove him from his government. Morcar and Edwin, two brothers, grandfons of the great duke Leofric, join'd in the insurrection; and the former being elected duke, advanced with an army to oppose Harold, who had been commissiion'd by the king to reduce and punish the Northumbrians. Before the armies engage'd, Morcar endeavoured to justify his conduct, and represent'd to Harold, that Tofti had behaved in such a manner, that no one, not even a brother, could defend him without participatig of the infamy of his conduct: that the Northumbrians were willing to submit to the king, but required a governor that would pay some attention to their privileges; and they trust-

ed that Harold would not defend in another that violent conduct from which his own government had always kept at so great a distance. This speech was accompanied by such a detail of well-supported facts, that Harold abandon'd his brother's cause, and returning to Edward, persuad'd him to pardon the Northumbrians, and confirm Morcar in his government. He even married the sister of that nobleman; and by his interest procured Edwin the younger brother to be chosen governor of Mercia. Tofti, in a rage, depart'd the kingdom, and took shelter in Flanders with Baldwin his father-in-law; while William of Normandy saw that now he had nothing to expect from Harold, who plainly intended to secure the crown fo himself.

Edward died in 1067, and was succeed'd by Har-}

old with as little opposition as though he had been the lawful heir. The very day after Edward's death, he was anointed and crown'd by the archbishop of York. The whole nation seem'd joyfully to swear allegiance to him. But he did not long enjoy the crown, to obtain which he had taken so much pains, and which he seem'd to have such capacity for retaining. His brother Tofti, provok'd at his fate, fir'd up against him every enemy he could have any influence with. The duke of Normandy also was enrag'd to the last degree at the perfidy of Harold; but before he commenced hostilities, he sent an embassy to England, upbraiding the king with his breach of faith, and sum-moning him to resign the kingdom immediately. Har-}

old reply'd, that the oath with which he was reproach'd, had been extorct'd by the well-grounded fear of violence, and for that reason could never be regarded as obligatory; that he never had any commissiion either from the late king or the states of England, who alone could dispose of the crown, to make any tender of the succession to the duke of Normandy; and if he, a private perfon, had assum'd so much authority, and had even voluntarily sworn to support the Duke's pretentions, the oath was unlawful, and it was his duty to take the first opportunity of breaking it; that he had obtained the crown by the unanimous suffrages of the people; and should show himself totally unworthy of their favour, did he not strenuously maintain those liberties with which they had enfranchis'd him; and that the Duke, if he made any attempt by force of arms, should experience the power of an united nation, com-mand'd by a prince, who, sensible of the obligations imposed upon him by his royal dignity, was determin'd, that the same moment should put a period to his life and to his government.

This answer was according to William's expectations; and therefore he had already made preparations for invading England. He was encourag'd and assist'd in this enterprise by l'owl count of Brittany, Baldwin earl of Flanders, the emperor Henry IV. and Pope Alexander II. The latter declared Harold a perjured usurper; denounced excommunication against him and his adherents; and the more to encourage William in his enterprises, sent him a consecrated banner, and a ring with one of St Peter's hairs in it. Thus he was enable'd to assemble a fleet of 2000 vessels, on board of which were embark'd 60,000 men, chosen from among those numerous supplies which were sent him from all quarters. Many eminent perons were enlisted un-
In order to embarrass the affairs of Harold the more effectually, William also excited Toth, in concert with Halsiger king of Norway, to infest the English coasts. These two having collected a fleet of 330 ships, sailed up the Humber, and disembarked their troops, who began to commit great deprivations. They were opposed by Morcar earl or duke (a) of Northumberland, and Edwin earl or Morda, who were defeated. Harold, on the news of this invasion, assembled a considerable army, engaged the enemy at Stamford, and after a bloody battle entirely defeated them. Toth and Halssier were killed in the action, and all the fleet fell into the hands of the victors; but Harold generously allowed Olave the son of Halssier to depart with 20 vessels.

The king of England had scarce time to rejoice on account of his victory, when news were brought him that the Normans were landed in Sussex. Harold's victory had considerably weakened his army. He left many of his bravest officers and folders in the action; and he disgraced the rest, by refusing to distribute the Danish spoils among them. He halted, however, by quick marches, to repel this new invader; but though he was reinforced at London and other places with fresh troops, he found himself weakened by the defection of his old folders, who, from fatigue and discontent, secretly withdrew from their colours. Guth, the brother of Harold, a man of great conduct as well as bravery, became apprehensive of the event; and entered the town to avoid a general engagement for some time, or at least not to hazard his person. But though this advice was in itself evidently proper, and enforced by all the arguments which Guth could suggest, Harold continued deaf to every thing that could be said. Accordingly, on the 14th of October 1066, the two armies engaged near Halting near of Sussex. After a most obstinate and bloody battle, the English were entirely defeated, Harold and his two brothers killed, and William left master of the kingdom of England.

Nothing could exceed the terror of the English upon the news of the defeat and death of Harold. As soon as William passed the Thames at Wallingford, Stigand, the primate, made submission to him in the name of the clergy; and before he came within sight of London, all the chief nobility, and even Edgar Atheling himself, who, being the rightful heir to the throne, had just before been declared king, came and submitted to the conqueror. William very readily accepted of the crown upon the terms that were offered him; which were, that he should govern according to the established customs of the country. He could indeed have made what terms he pleased; but, though really a conqueror, he chose rather to be thought an elected king. For this reason he was crowned at Westminster by the archbishop of York, and took the oath administered to the former kings of England; namely,

that he would protect and defend the church, observe the laws of the realm, and govern the kingdom with impartiality.

The English historians complain of the most grievous oppression by William and his Normans. Whether by his conduct the conqueror willingly gave the wholly opposite opportunities of rebelling against him, in order to have a pretence for oppressing them afterwards, is not easy to say; but it is certain that the beginning of his reign cannot justly be blamed. The first difficulty against his government was excited among the clergy. William could not avoid the rewarding of those numerous adventurers who had accompanied him in his expedition. He first divided the lands of the English barons who had opposed him among his Norman barons; but as these were found insufficient, he quartered the rest on the rich abbeys, of which there were many in the kingdom, until some other opportunity of providing for them offered itself.

Though this first step was highly resented by the clergy, it gave very little offence to the laity. The whole nation, however, was soon after disquieted, by seeing all the real power of the kingdom placed in the hands of the Normans. He disarmed the city of London, and other places which appeared most warlike and populous, and quartered Norman soldiers wherever he dreaded an insurrection. This was indeed acting as a conqueror, and not as an elected king; but the event showed the necessity of such precautions. The king having thus secured himself, as he imagined, England from any danger of a revolt, determined to pay a visit to his Norman dominions. He appointed his brother Odo, bishop of Bayeux, and William Fitz-Obborne, regents in his absence; and to secure himself yet farther, he resolved to carry along with him such of the English nobility as he put the least confidence in.

Having taken all these methods to enforce the tranquillity of his new kingdom, William set off for Normandy in March 1067; but his absence produced the most fatal consequences. Discontents and murmurings were multiplied everywhere; secret conspiracies were entered into against him; he himself was assailed in many places; and every thing seemed to threaten speedy revolution. William of Poëtiers, a Norman historian, throws the blame entirely on the English. He calls them a sullen, and mutinous race, while he celebrates with the highest encomiums the justice and lenity of Odo's and Fitz-Obborne's administration. On the other hand, the English historians tell us, that these governors took all opportunities of oppressing the people, either with a view to provoke them to rebellion, or in case they tamely submitted to their impositions, to grow rich by plundering them. Be this as it will, however, a secret conspiracy was formed among the English for a general massacre of the Normans, like what had formerly been made of the Danes: This was prosecuted with so much animosity, that the valet of the earl of Coxo put him to death because he refused to head them in the enterprise. The conspirators had already taken the resolution, and fixed the day for their intended massacre, which was to be on All-Wednesday, during the time of divine service,

([a] Anciently these two titles were synonymous.)
vice, when all the Normans would be unarmed as per-
nitants, according to the discipline of the times. But
the presence of William disconcerted all their schemes.
Having got intelligence of their bloody purpose, he
haunted over to England. Such of the conspirators
as had been more open in their rebellion, consulted their
safety by flight; and this served to confirm the proofs
of an accusation against those who remained. From
this time the king not only lost all confidence in his
English subjects, but regarded them as inveterate and
irreconcilable enemies. He had already raised such a
number of fortresses in the country, that he no longer
dreaded the tumultuous or transient efforts of a
dischattened multitude. He determined therefore to
them as a conquered nation. The first instance
of this treatment was his revival of the tax of Dane-
gelt, which had been imposed by the Danish con-
querrors, and was very odious to the people. This
produced great discontent, and even insurrections.
The inhabitants of Exeter and Cornwall revolted; but
were soon reduced, and obliged to implore the mercy
of the Conqueror. A more dangerous rebellion hap-
pened in the north: but this was also quelled, and the
English became sensible that their submission
was intended. Their easy submission after the battle
of Haftings had inspired the Normans with contempt;
their commotions afterwards had rendered them ob-
jects of hatred; and they were now deprived of every
expedient which could make them either regarded or
beloved by their sovereign. Many fled into foreign
countries; and among the rest Edgar Atheling him-
self, who made his escape to Scotland, and carried
thither his two sisters Margaret and Christina. They
were well received by Malcolm, who soon after mar-
rried Margaret the elder sister, and also received great
numbers of other exiles with the utmost kindness.

When all this was published in England, the con-
querrors, having thefe suspicions, advised their men
to quit the field, and was quickly

The English, though unable to make any resistance
openly, did not fail to gratify their resentment against
the Normans in a private manner. Seldom a day pas-
fed, but the bodies of affinalled Normans were found
in the woods and high-ways, without any possibility
of bringing the perpetrators to justice. Thus, at length,
the conquerors themselves began again to wish for
quittance and security; and several of them, though
entrained with great commands, desired to be diffi-
fed the service. In order to prevent these defections,
which William highly resented, he was obliged to
allure others to fly by the largeness of his bounties.
The consequences were, fresh exactions from the
English, and new insurrections on their part against
their cruel masters. The Norman power, however,
was too well founded to be now removed, and every
attempt of the English to regain their liberty served
only to rivet their chains the more firmly. The county
of Northumberland, which had been most active in these
insurrections, now suffered most severely. The whole
of it was laid waste, the houses were burned, the in-
struments of agriculture destroyed, and the inhabitants
forced to seek new places of abode. On this occasion
it is said that above 10,000 persons perished either by
the sword or famine; and the country is supposed, even
to this day, to retain the marks of its ancient depopu-
lation. The estates of all the English gentry were re-
duced to beggary; and the English found themselves
totally excluded from every road that led either to ho-
nor or preferment.

By proceeding in this manner, William at last broke
the spirit of the English nation, and received no far-
ther trouble from them. In 1076, however, he found
that the latter part of his life was likely to be unhap-
py through dissensions in his own family. He had four
sons by his first marriage: William, Robert, Richard,
and Henry, besides several daughters. Robert, his eldest son, was known as Curthose, from the fierceness of his legs, was a prince
who inherited all the bravery and ambition of his fa-
mily. He had formerly been promised by his father
the government of the province of Maine in France,
and was also declared successor to the dukedom of Nor-
mandy. He demanded from his father the fulfilment
of these promises; but William gave him a flat denial,
observing, that "it was not his custom to throw off
his clothes till he went to bed." Robert declared his
revenu; and openly expressed his jealousy of his
two brothers William and Henry, (for Richard was
killed, in hunting, by a stag). An open rapture was
now commenced. The two young princes one day
took it into their heads to throw water on their elder
brother as he passed through the court after leaving
their apartments. Robert construed this frolic into a
studied indignity; and having thefe jealousy still far-
other inflamed by one of his favourites, he drew his
sword, and ran up stairs with an intent to take re-
venge. The whole castle was quickly filled with tur-
mult, and it was not without some difficulty that the
king himself was able to appease it. But he could not
allay, the animosity which from that moment prevail-
ed in his family. Robert, attended by several of his
confederates, withdrew to Rouen that very night, hop-
ing to forspike the castle; but this design was defeat-
ed by the governor. The popular character of the
prince, however, engaged all the young nobility of
Normandy, as well as of Anjou and Brittany, to e-
spouse his quarrel; even his mother is supposèd to have
supported him in his rebellion by secret remittances.
The unnatural contest continued for several years; and
William was at last obliged to have recourse to Eng-
land for support against his own son. Accordingly,
he drew an army of Englishmen together: he led them
over to Normandy, where he soon compelled Robert
and his adherents to quit the field, and was quickly re-
infated in all his dominions. Robert then took the-
ther in the castle of Gerberoy, which the king of France
had provided for him, where he was shortly after be-
sieged by his father. As the garrison was strong, and
conscientious of their treason, they made a gallant defence;
and many skirmishes and duels were fought under its
walls. In one of thes the king and his son happened
to meet; but being both concealed by their hel-
ments, they attack each other with mutual fury. The
young prince wounded his father in the arm, and threw
him from his horse. The next blow would probably
have put an end to his life, had he not called for af-
fiance. Robert instantly recollected his father's voice,
leaped from his horse, and raised him from the ground.
He proliferated himself in his presence, asked pardon for
his offences, and promised for the future a strict ad-
herence to his duty. The king was not so easily ap-
peased; and perhaps this resentment was heightened
by
by the disgrace of being overcome. He therefore gave his malice against his son; and returned to his own camp on Robert’s horse, which he had affurd him to mount. After some recollection, however, he was reconciled to Robert, and carried him with him into England.

William returned in 1081; and being now freed from his enemies both at home and abroad, began to have more leisure to attend to his own domestic affairs. For this purpose the Doome-de-Bock was composed by his order, of which an account is given under that article. He reserved a very ample revenue for the crown; and in the general distribution of land among his followers, kept possession of no fewer than 1400 manors in different parts of the country. No king of England was ever so opulent; none was able to support the splendor and magnificence of a court to such a degree; none had so many places of root and profit to bestow; and consequently none ever had such implicit obedience paid to his commands. He delighted greatly in hunting; and to indulge himself in this with the greater freedom, he depopulated the county of Hampshire for 30 miles, turning out the inhabitants, destroying all the villages, and making the wretched outcasts no compensation for such an injury. In the time of the Saxon kings, all noblemen without distinction had a right to hunt in the royal forests; but William appropriated all these to himself, and published very severe laws to prohibit his subjects from encroaching on this part of his prerogative. The killing of a boar, a deer, or even an hare, was punished with the loss of the delinquent’s eyes; at the time when the killing of a man might be atoned for by paying a moderate fine or composition.

As the king’s wealth and power were so great, it may reasonably be supposed, that the riches of his ministers were in proportion. Odo, bishop of Bayeux, William’s brother, was become so rich, that he resolved to purchase the papacy. For this purpose, taking the opportunity of the king’s absence, he equipped a vessel in the Isle of Wight, on board of which he sent immense treasures, and prepared for his embarkation. He was detained, however, by contrary winds; and, in the mean time, William, being informed of his design, resolved to prevent the exportation of so much wealth from his dominions. Returning therefore from Normandy, where he was at that time, he came to England the very instant his brother was stepping on board. He immediately ordered him to be made prisoner; but his attendant, respecting the bishop’s ecclesiastical character, scrupled to execute his commands; so that the king was obliged to seize him with his own hand. Odo appealed to the Pope; but the king replied, that he did not seize him as bishop of Bayeux, but as earl of Kent; and, in that capacity, he expected, and would have, an account of his administration. He was therefore sent prisoner to Normandy; and, notwithstanding all the remonstrances and threats of Pope Gregory, was detained in custody during the remainder of William’s reign.

Soon after this, William felt a severe blow in the death of the queen; death of Matilda his queen; and, almost at the same time, received information of a general insurrection in Maine, the nobility of which had always been averse to his government. Upon his arrival on the continent, he found that the insurgents had been secretly assisted and excited by the king of France, who took all opportunities of lowering the Norman power, by creating divisions among the nobles. His displeasure on this account was very much increased, by notice he received of some rambles thrown out against him by the French monarch. It seems that William, who was become corpulent, had been detained in bed some time by sickness; and Philip was heard to say, that he only lay in of a big belly. This so provoked the English monarch, that he sent him word, he would soon be up, and would, at his churching, present such a number of tapers as would set the kingdom of France in a flame.

To perform this promise, he levied a powerful army; and, entering the Isle of France, destroyed everything with fire and sword. He took the town of Mante, and reduced it to ashes. But a period was soon put to the conquests and to the life of this great warrior by an accident. His horse happening to put his fore feet on some hot ashes, plunged so violently, that the rider king was thrown forward, and bruised his belly on the pommel of the saddle. Being now in a bad habit of body, as well as somewhat advanced in years, he began to be apprehensive of the consequences, and ordered himself to be carried in a litter to the monastery of St. Germain. Finding his illness increas’d, and being sensible of the approach of death, he discovered at last the vanity of all human grandeur; and was brace with remorse for those many cruelties and violations of which he had been guilty. He endeavoured to make compensation by presents to churches and monasteries, and gave orders for the liberation of several English noblemen. He was even prevailed upon, though not without reluctance, to release his brother Odo, against whom he was very much incensed. He left Normandy and Maine to his eldest son Robert. He wrote to Lanfranc the primate of England, desiring him to crown William king of England. To Henry he bestowed nothing but the possessions of his mother Matilda; but foretold, that one day he would usurp both his brothers in power and opulence. He expired on the 9th September 1087, in the 63d year of his age, in the 21st of his reign over England, and 54th of that over Normandy.

William, surnamed Rufus, from his red hair, was in William Normandy at the time of his father’s illness. He no Rufus, sooner received the letter for Lanfranc, than, leaving his father in the agonies of death, he set out for England; where he arrived before intelligence of the decease of the Conqueror had reached that kingdom. Being sensible that his brother Robert, as being the eldest son, had a preferable title to himself, he hastened the utmost dispatch in getting himself firmly established on the throne. The English were so effectually subdued, that they made no opposition; but the Norman barons were attached to Robert. This prince was brave, open, sincere, and generous; and even his predominant fault of indolence was not disagreable to those haughty barons, who affected an almost total independence of their sovereign. The king, on the other hand, was violent, haughty, and tyrannical. A powerful conspiracy was therefore carried on against William; and Odo, bishop of Bayeux, undertook to conduct it. Many of the most powerful nobility were concerned; and
as the conspirators expected to be in a short time supported by powerful succours from Normandy, they retired to their castles, and put themselves in an offensive posture.

William, sensible of his danger, engaged the English on his side, by promising some mitigation of his hardships, and liberty to hunt in the royal forests. Robert, in the mean time, through his natural indolence, neglected to give his allies proper assistance. The conspirators were obliged to submit. Some of them were pardoned; but most of them confederated, and their estates bestowed on the barons who had continued faithful to the king.

William, freed from this danger, thought no more of his promises to the English. He proved a greater tyrant than his father; and, after the death of Lanfranc, who had been his preceptor, and kept him within those bounds, he gave full scope to his violent and rapacious disposition. Not content with oppressing the laity, he invaded the privileges of the church; which, in those days, were held most sacred. He seized the temporalities of all the vacant bishoprics and abbeys, and openly put to sale those fees and abbey rights. He was then put in possession of Normandy and Maine; and Robert with a magnificient train set out for the Holy Land.

Proves a tyrant.

Attempts the conquest of Normandy.

The peace with Robert was of no long duration. The king thought himself strong enough to attempt the conquest of Normandy, which at that time was in the greatest confusion, with the insolent and negligent administration of Robert. Several of the barons had revolted, and these revolts were encouraged by the king of France. Robert also imagined he had reason to fear the intrigues of his other brother Henry, whom for 3000 marks he had put in possession of Cotentin, near a third part of the duchy of Normandy. He therefore threw him into prison; but finding himself threatened with an invasion of the king of England, he gave Henry his liberty, and even made use of his assistance in suppressing the insurrections of his rebellious subjects. William, however, was no sooner landed in Normandy, than the nobility on both sides interposed, and a treaty of peace was concluded. In this treaty Henry finding his interests entirely neglected, retired to St. Michael's Mount, a strong fortress on the coast of Normandy, and infected the neighbourhood with his incursions. He was besieged by his two brothers, and obliged to capitulate in a short time; after which being deprived of all his domains, he wandered about for some time with very few attendants, and often in great poverty.

The peace with Robert was of no long duration. In the interval some hostilities with Scotland succeeded, and these terminated in the death of Malcolm king of that country; after which new broils ensued with Normandy. The rapacious temper of William prompted him to encroach upon his brother's territories, and the famé rapacity prompted him to use a very extraordinary expedient in order to accomplish his designs. Having gone over to Normandy to support his partisans, he ordered an army of 20,000 men to be raised in England, and conducted to the sea-coast as if they were to be immediately embarked; but when they came there, instead of embarking, they were forced to pay the king ten shillings a man; after which they were dismissed to their several countries. With this money William engaged the king of France to depart from the protection of Robert; and also bribed many of the Norman barons to revolt. He was called from Normandy, however, by an interruption of the Welsh; and having repulsed them, he was prevented from attempting other enterprises by a conspiracy of his barons.

In 1096, however, the superposition of Robert put the king of England in possession of those dominions the duchy which he had not been able to conquer by force of arms. The crusades were now commenced, and Robert was desirous of undertaking an expedition into the Holy Land. As money for this purpose was wanting, he mortgaged his dominions to his brother for 10,000 marks. The king raised the money by violent extortions on his subjects; forcing even the convents to melt their plate, in order to furnish the quota demanded of them. He was then put in possession of Normandy and Maine, and Robert with a magnificent train set out for the Holy Land.

After the death of Lanfranc, the king had retained in his own hands the revenues of Canterbury, as he had done those of many other bishoprics; but falling into a dangerous illness, he was seized with remorse, and the clergy represented to him that he was in danger of eternal perdition if he did not make atonement for those impieties and sacrileges of which he had been guilty. He therefore instantly resolved to supply the vacancy of Canterbury; he sent for Anselm, a Piedmontese by birth, abbot of Bee in Normandy, who was much celebrated for his piety and devotion. The abbots refused the dignity with great earnestness; fell on his knees, wept, and intreated the king to change his purpose; and when he found him obstinate in forcing the pastoral staff upon him, he kept his fist so hard clenched, that it required the utmost violence of the bystanders to open it, and force him to receive that ensign of his spiritual dignity. William soon after recovered his health, and with it his violence and rapacity. As he now spared the church no more than before, a His quarrel quarrrel with Anselm soon ensued; and this was the more dangerous to the king, on account of the great character for piety which the primate had acquired by his zeal against abuses of all kinds, particularly those of drefs and ornament.

At this time there was a mode which prevailed not only in England, but throughout Europe, both among men and women, of giving an enormous length to their shoes, drawing the toe to a sharp point, and affixing to it the figure of a bird's bill, or some such ornament, which was turned upwards, and which was often fastened by gold or silver chains tied to the knee. The ecclesiastics took exception at this ornament, which they said was an attempt to bely the scripture, where it is affirmed, that no man can add a cubit to his stature; and they not only declared against it with vehemence, but assembled some synods, in which the fashion was absolutely condemned. Such, however, are the contradictions in human nature, that all the influence of the clergy, which at that time was sufficient to send vast multitudes of people into Asia to butcher one another, was not able to prevail against those pointed shoes. The fashion, contrary to what hath happened to almost all others, maintained its ground for several centuries; and even Anselm found his endeavours
devours against it ineffectual. He was more successful in decrying the long hair and curled locks then worn by the courtiers. He refused the alms on Ash-Wednesday to such as were so accoutred; and his authority and eloquence had such influence, that the young men universally abandoned that ornament, and appeared in the cropt hair recommended to them by the sermons of the primate. For this reformation Anselm is highly celebrated by his historian Eadmer, who was also his companion and secretary.

When William's profaneness returned with his health, he was engaged in almost perpetual contests with this austere prelate. These were pretty well settled, when the king, who had undertaken an expedition into Wales, required Anselm to furnish him with a certain number of soldiers. The primate regarded this as an invasion of the rights of the church; and therefore, tho' he durst not refuse compliance, sent the men so miserably accoutred, that the king was exceedingly displeased, and threatened him with a prosecution. Anselm demanded restitution of all his revenues which the king had seized, and appealed to the Pope. The quarrel, however, ran so high that the primate found it dangerous to remain in England. He desired and obtained the king's permission to retire beyond sea. His temporalities were confiscated immediately on his departure; but pope Urban received him as a martyr in the cause of religion, and even threatened the king with sentence of excommunication. William, however, proceeded in his projects of ambition and violence, without regarding the threats of the Pope; who he knew was at that time too much engaged with the crusades to mind any other businesse. Though his acquisition of Maine and Normandy had brought him into perpetual contests with the haughty and turbulent barons who inhabited those countries, and raised endless tumults and insurrections; yet William seemed still intent on extending his dominions either by purchase or conquest. William Earl of Poitiers and Duke of Guienne had resolved upon an expedition to the Holy Land; and, for this purpose, had put himself at the head of a vast multitude, consisting, according to some historians, of 60,000 horse, and a much greater number of foot. Like Robert of Normandy, he offered to mortgage his dominions for money sufficient to conduct this multitude into Asia. The king accepted his offer; and had prepared a fleet and army to take possession of these dominions, when an unfortunate accident put an end to his projects and his life. He was engaged in hunting, the sole amusement, and indeed the principal occupation, of princes in those rude times. Walter Tyrrell, a French gentleman, remarkable for his skill in archery, attended him in this recreation, of which the new forest was the scene. William had dismounted after a chase; and Tyrrell, impatient to show his dexterity, let fly an arrow at a flag which suddenly started before him. The arrow glanced from a tree, and struck the king to the heart. He instantly fell down dead; and Tyrrell, terrified at the accident, clapt spurs to his horse, hastened to the sea-shore, and embarked for France, where he joined the crusade that was setting out from that country. This happened on the 21 of August 1100, after the king had reigned 13 years, and lived about 40. His body was found in the woods by the country people, and buried without ceremony atWinchesfer.

After the death of William, the crown of right devolved to Robert his elder brother; for William had no legitimate children. But what Robert had formerly lost by his indiscretion, he was again deprived of by his absence at the holy war. Prince Henry was in the forest with William Rufus at the time the latter was killed. He no sooner heard the important news, than he hurried to Winchesfer, and secured the royal treasure. William de Breteuil, keeper of the treasure, arrived almost the same instant, and opposed his pretensions; telling him, that the treasure belonged to his elder brother, who was now his sovereign, and for whom he was determined to keep it. But Henry, drawing his sword, threatened him with instant death if he dared to disobey him; and others of the late king's retinue, who came every moment to Winchesfer, joining the prince's party, he was obliged to desist. Henry lost no time in fully accomplishing his purpose. In less than three days he got himself crowned king of England by Maurice bishop of London. Present possession supplied every deficiency of title; and no one dared to appear in defence of the absent prince.

The beginning of king Henry's reign promised to His charter be favourable to the English liberty; owing chiefly to Ina in favour of his fear of his brothers. To conciliate the affections of his subjects, he passed a charter calculated to remove many of the grievous oppressions which had been complained of during the reigns of his father and brother. He promised, that at the death of any abbot or bishop, he never would seize the revenues of the see or abbey during the vacancy, but would leave the whole to be reaped by the successor; and that he would never let to farm any ecclesiastical benefice, without being expostulated to those enormus exactions which had been formerly required. He remitted the wardship of minors; and allowed guardians to be appointed, who should be answerable for the trust. He promised not to dispoze of any heirfs in marriage but by advice of all the barons; and if any baron intended to give his daughter, sister, niece, or kinswoman, in marriage, it should only be necessary for him to consult the king, who promised to take no money for his consent, nor ever to refuse permission, unless the person to whom it was proposed to marry her should happen to be his enemy. He granted his barons and military tenants the power of bequeathing by will their money or personal estates; and if they neglected to make a will, he promised that their heirs should succeed to them. He renounced the right of imposing moneys, and of levying taxes at pleasure, on the farms which the barons kept in their own hands. He made some general proffessions of moderating fines; he offered a pardon for all offences; and remitted all debts due to the crown. He also required, that the vassals of the barons should enjoy the same privileges which he granted to his own barons; and he promised a general confirmation and observance of the laws of king Edward. To give greater authenticity to these concessions, a

*See Fudall
King Henry, farther to increase his popularity, degraded and committed to prison Ralph Flambard bishop of Durham, who had been the chief instigator of oppression under his brother. He sent for Ansfelm, who was then at Lyons, inviting him to return and take possession of his dignities. Ansfelm returned; but when Henry proped to him to do the same homage to him which he had done to his brother, the king met with an absolute refusal. During his exile, Ansfelm had affiled at the council of Bari; where, besides fixing the controversy between the Greek and Latin churches concerning the procession of the Holy Ghost, the right of election to church-preferments was declared to belong to the clergy alone, and spiritual furies were denounced to laymen for their fees and benefices, and on all laymen who exacted it. The rite of homage by the feudal customs was, that the vassal should throw himself on his knees, put his joined hands between those of his superior, and should in that posture swear fealty to him. But the council declared it execrable, that pure hands, which could create God, and offer his blood, should be corrupted by profane hands, which, besides being imured to rapine and bloodshed, were employed day and night in impure purposes and obscene contads. To this decree therefore Ansfelm appealed; and declared, that so far from doing homage for his spiritual dignity, he would not even communicate with any ecclesiastic who paid that submission, or who accepted of investitures from laymen. Henry durst not insist; and therefore desired that the controversy might be suspended, and that messengers might be sent to Rome to accommodate matters with the Pope, and to obtain his confirmation of the laws and customs of England.

Henry now took another step which seemed capable of confirming his claims to the crown without any danger of a rival. The English remembered with regret their Saxon monarchs, when they compared the liberty they enjoyed under them with the tyranny of the Normans. Some descendants of that favourite line still remained; and among the rest, Matilda, the niece of Edgar Atheling. Upon her the king fixed his eyes as a proper comfort, by whose means the breach between the Saxons and Normans might be cemented. A difficulty, however, occurred, because he had been educated in a nunery. The affair was examined by Ansfelm in a council of prelates and nobles summoned at Lambeth. Matilda there proved, that she had put on the veil, not with a design of entering into a religious life, but merely in imitation of a custom familiar to the English ladies, who protected their chastity from the brutal violence of the Normans by taking shelter under that habit, which amid the horrid licentiousness of the times was yet generally revered. The council, senfible that even a prince's had otherwise no security for her honour, admitted this reason as valid. They pronounced that Matilda was still free to marry; and her nuptials with Henry were celebrated by Ansfelm with great solemnity and pomp.

While Henry was thus rendering himself popular at home, his brother Robert, who had loitered away a twelvemonth in Italy, where he married Sibylia daughter of the count of Conzeva, arrived in England, in 1071, in order to put in his late and ineffectual claim to the crown. His fame, however, on account of the exploits he had performed in Palestine, was so great, claimed by that even yet he was joined by many noblemen of the first rank, and the whole nation seemed prepossessed in his favour. But Henry, having paid his court to Ansfelm, by his means retained the army in his interests, and marched with them to Porthsmouth, where Robert had landed his forces a few days before. The armies lay for some time in sight of each other; when an accommodation was effected through the mediation of Ansfelm and other great men. By this treaty it was agreed, that Robert should resign his pretensions to England, and receive in lieu of them an annual pension of 4000 marks; that if either of the princes died without issue, the other should succeed to his dominions; that the adherents of each should be pardoned, and restored to all their possessions either in Normandy or England; and that neither Robert nor Henry should henceforth encourage, receive, or protect, the enemies of each other.

The two princes parted with mutual marks of friendship; but next year, Henry, under various pretences confiscated the estates of almost all the noblemen who had favoured his brother's pretensions. Robert, enraged at the fate of his friends, ventured to come to England in order to remonstrate with his brother in person. But he met with such a bad reception, that, apprehending his liberty to be in danger, he was glad to make his escape by resigning his pension.

This infringement of the treaty was followed the Normandy ensuing year by an invasion of Normandy, at the desire of five of Robert's own subjects, whom he was totally incapable of governing. The event of this war was the defeat and captivity of Robert, who was henceforth deprived not only of all his dominions, but of his personal liberty. He lived 28 years a prisoner, and died in the castle of Cardiff in Glamorganshire. It is even said by some, that he was deprived of his fight by a red-hot copper baron applied to his eyes, and that king Henry appeased his conscience by founding the monastery of Reading.

The conquest of Normandy was completed in 1066; and next year the controversy between the king and primate, concerning the investitures of clergymen and their doing homage to princes, was refumed. The king was very sensible that it was not his interest to quarrel with such a powerful body as the clergy were at that time; and on the other hand he fully understood the necessity of guarding the prerogatives of the crown from their encroachments. While, therefore, he a Quarrel avoided an open rupture with Ansfelm, he obstinately refused to give up the privileges which had been enjoyed by his predecessors. On the first arrival of Ansfelm, the king had avoided the dispute in the manner already mentioned. A messenger was dispatched to Rome, in order to compromise matters with the Pope. The messenger returned with an absolute refusal of the king's demands. One of the reasons given by the Pope on this occasion, was expressed in the following words: 105 104 It is monstrous that a son should pretend to beget his father, or a man to create his God: priests are called
England called gods in scripture, as being the vicars of God: and will you, by your abominable pretensions to grant them their investitures, affume the right of creating them?" Henry was not yet convinced; but as he was determined to avoid, or at least to delay, the coming to any dangerous extremity with the church, he per-
suaded Anselm, that by farther negotiation he should be able to compound matters with the Pope. Me-
fencers were therefore dispatched to Rome a second 
time from the king; and also from Anselm, who wanted to be fully assured of the Pope's intentions. They 
returned with letters wrote in the most arrogant and po-
itive manner, both to the king and primate. The king per-
suaded the letter sent to himself; and perma-
ned the three bishops, by whom it was sent, to affers, 
upon their episcopal faith, that the Pope had assur-
ed them of his private good intentions towards king 
Henry, and of his resolution not to refer any future 
exertion of his prerogative in granting investitures; 
though he himself scrupled to give this assurance un-
der his hand, left other princes should copy the example 
and thereby odious, returned the enfeigns of their fpiritual 
dignity. At the same time the marriage of 
priests was prohibited; and even laymen were not al-
lowed to marry within the seventh degree of affinity. 
By this contrivance the Pope augmented the profits 
which he reaped from granting dispensations, and like-
wise those from divorces. For as the art of writing 
was then rare, and parish-registers were not regularly 
kept, it was not easy to ascertain the degrees of affi-
nity even among people of rank; and any man who 
had money to pay for it, might obtain a divorce, 
upon pretence that his wife was more nearly related to 
him than was permitted by the canons. A decree was 
also published, prohibiting the clergy to wear long hair; 
and the king, tho' he would not reign his prerogatives 
to the church, very willingly cut his hair in the form 
which was required of him, obliging all the courtiers at 
the same time to follow his example.

From the time of this compromise, which happened 
in 1107, to the year 1120, nothing remarkable hap-
pened except some flight commotions in Normandy: 
but this year, prince William, the king's only son, 
was unfortunately drowned off the coast of Normandy: 
and Henry was too much affected, that he is said never 
aftemwards to have failed or recovered his wonted 
cheerfulness. It is very doubtful, however, whether 
the death of this prince was not an advantage to the 
British nation, since he was often heard to express 
the utmost hatred to the natives: in so much that he had 
threatened, that when he came to the throne, 
he would make them draw the plough, and would turn 
them into beasts of burden. These prepossessions he 
inherted from his father; who, though he was wont, 
when it might serve his purposes, to value himself on 
his birth as a native of England, showed, in the course 
of his government, an extreme prejudice against that 
population. All hopes of preferment to ecclesiastical as 
well as civil dignities were denied to the English during 
this whole reign; and any foreigner, however igno-
rant or worthless, was farre to have the preference in 
every competition. The charter formerly mentioned, 
which the king granted at the beginning of his reign, 
was no more thought of; and the whole fell so much 
into neglect and oblivion, that in the following cen-
tury, when the barons, who had heard an obscure tra-
dition of it, desired to make it the model of the great 
charter which they expected from king John, they could 
only find one copy of it in the whole kingdom; while 
the grievances, proposed to be redressed by it, con-
tinued full in their full extent.

As Henry had now no legitimate children except 
Matilda, whom in 1110 he had betrothed, though 
only eight years of age, to the emperor of Germany, 
he was induced to marry a second time in hopes of 
having sons. He made his address accordingly to A-
delais the daughter of Godfrey Duke of Lovaine, 
and niece to Pope Calixtus; a young princess of an ami-
able person. But Adelais brought him no children.

In 1153, the king died in Normandy, from eating 
too plentifully of lampreys; having lived 67 years, and 
King Hen-

r.
married, after her first husband's death, to Geoffrey Plantagenet eldest son of the count of Anjou, by whom she had a son named Henry: but as Geoffrey had given umbrage to the king of England in several instances, no notice was taken of him in the will. The nobility had already sworn fealty to her; and the foremost to show this mark of submission to the king's will had been Stephen, son of the count of Blois (who had married Adela the daughter of William the Conqueror). He had been married to Matilda daughter and heiress of Eustace Count of Boulogne; who brought him, besides that feudal sovereignty of France, a vast property in England, which in the distribution of lands had been conferred by the Conqueror on the family of Boulogne. By this marriage Stephen acquired a new connection with the royal family of England: for Mary his wife's mother, was sister to David the present king of Scotland, and to Matilda the first wife of Henry and mother of the empress. The king, also, imagining that by the aggrandizement of Stephen he strengthened the interest of his own family, had enriched him with many possessions; but instead of this, it appeared by the event, that he had only put it more and more in his power to usurp the throne.

No sooner was Henry dead, than Stephen hastened from Normandy into England. The citizens of Dover and Canterbury, apprized of his purpose, shut their gates against him; but when he arrived at London, some of the lower classes of people, infligated by his emilities, immediately proclaimed him king. The archbishop of Canterbury refused to give him the royal unction; but this difficulty was got over by Stephen's brother the bishop of Winchester. Hugh Bigod, steward of the household, made oath before the primate, that the late king, on his death-bed, had discovered a dissatisfaction with his daughter Matilda, and had expressed his intention of leaving the Count of Boulogne heir to all his dominions, and the bishop, either believing, or pretending to believe, this testimony, gave Stephen the royal unction. Very few of the nobility attended his coronation; but none opposed his usurpation, however unjust or flagrant.

Stephen, in order to establish himself on the throne as firmly as possible, passed a charter, in which he made liberal promises to all ranks of men. To the clergy he promised, that he would speedily fill all the vacant benefices, and never would levy any of the rents during the vacancy. To the nobility he gave liberty to hunt in their own forests; and to the people he promised to remit the tax of dancet, and to restore the laws of Edward the Confessor. He seized the king's treasure at Winchester, amounting to £100,000; with part of which money he hired mercenary soldiers from the continent; and with another part procured a bull from the Pope, confirming his title to the English throne.

Matilda, in the mean time, endeavoured to recover her just rights of which Stephen had deprived her; but for some time she met with no success either in England or Normandy. Her husband Geoffrey himself was obliged to conclude a peace with Stephen, on condition of the king's paying him during that time an annual pension of £5,000. Robert Earl of Gloucester was the first who shook the power of Stephen. He was natural son to the late king; a man of great honour and ability, and was very much attached to the interests of Matilda. When Stephen usurped the throne, he offered to do him homage, and take the oath of fealty; but with an express condition, that the king should maintain all his stipulations, and never invade any of Robert's rights or dignities. With this condition Stephen was obliged to comply, on account of the great power of that nobleman, though he knew that it was meant only to afford him a favourable opportunity of revolting when occasion served. The clergy imitated Robert's example; and annexed to their oath of allegiance the following condition, namely, that they were only bound as long as the king defended the ecclesiastical liberties, and supported the discipline of the church. The barons, in return for their submission, exacted terms of still more pernicious tendency. Many of them required to have the right of fortifying their castles and putting themselves in a posture of defence; and with this exorbitant demand the king was forced to comply. All England was immediately filled with these forresses; which the noblemen garrisoned either with their vassals, or with licentious soldiers, who flocked to them from all quarters. The whole kingdom now became a scene of rapine and devastation.

Wars were carried on by the nobles in every quarter; the barons even assumed the right of coining money, and of exercising, without appeal, every act of jurisdiction; and the inferior gentry, as well as the people, finding no defence from the laws, during this total dislocation of sovereign authority, were obliged, for their immediate safety, to pay court to some neighbouring chieftain, and to purchase his protection, both by submitting to his exactions, and by affisting him in his rapine upon others.

In 1137, the Earl of Gloucester having projected an insurrection, retired beyond sea, lest the king a defiance, and solemnly renounced his allegiance. The next year David king of Scotland appeared with an army in defence of his niece's title; and penetrating into Yorkshire, committed the greatest devastations. He was defeated, however, with great slaughter, at Northallerton, by some of the northern barons, who had raised a powerful army; and this success so much overawed the malecontents in England, that Stephen's power might have received some stability, had he not unfortunately engaged himself in a contest with the clergy. He had already seen the mischief arising from the liberty he had granted of fortifying so many castles in different parts of the kingdom. He therefore determined to abridge this liberty as much as possible; and for that purpose he began with the castles erected by the clergy, who seemed to have left or to have military securifies than the barons. Taking advantage therefore of a frac which had arisen at court between the retnue of the bishop of Salisbury and the Earl of Britanny, he seized the bishops of both Salisbury and Lincoln, threw them into prison, and obliged them to deliver up the castles which they had lately erected. This produced such a violent commotion, that the opportunity seemed favourable to the pretentions of Matilda. On the 2nd of September 1139, the Matilda landed in England with Robert Earl of Gloucester, attended only by 140 knights; but her partizans daily increased, and she was soon in a condition to face Stephen.
phenomenon with equal forces in the field. Numberless encounters happened, the detail of which could afford very little entertainment to the reader. War was spread through every quarter; and the turbulent barons, having, in a great measure, shaken off all restraint of government, and now obtained the sanction of fighting in the cause of their country, redoubled their oppressions, tyrannies, and devastations. The castles of the nobility became receptacles of licentious robbers; who, falling forth day and night, spoiled the open country, plundered the villages, and even cities. They tormented the captives to make them reveal their treasures; sold their persons to slavery; and set fire to the houses, after they had pillaged them of every thing valuable. In consequence of this destruction, the land was left untilled; the instruments of husbandry were abandoned; and a grievous famine reduced the nation to the most deplorable state that can be imagined.

After a multitude of indecisive conflicts, a battle ensued which seemed likely to enforce the public peace for some time. Stephen had marched his forces to relieve the city of Lincoln; the Earl of Gloucester led a body of troops to attack those of Matilda's party, who were besieging that place. The two armies engaged on the 2d of February within sight of the city, and a desperate battle ensued. At last Stephen's army was defeated. He himself was for some time left without attendants; and fought on foot in the midst of his enemies, assaulted by multitudes, and resisting all their efforts with astonishing intrepidity. Being hemmed in on every side, he forced a way for some time with his battle-ax; but that breaking, he drew his sword, and with it furiously assaulted his antagonists for some time longer. But at length the sword also flying in pieces, he was obliged to surrender himself a prisoner. He was conducted to Gloucester; and though at first treated with respect, he was in a short time, upon some suspicions, thrown into irons.

About a month after, Matilda was crowned at Winchester with great solemnity; but soon showed herself totally incapable of governing such a turbulent nation. She determined to repulse the power of the nobles, who had now left only the shadow of authority to their sovereignty. But being destitute of policy or prudence sufficient to accomplish an undertaking, a conspiracy was soon formed against her, and the bishop of Winchester detached a party of his friends and vassals to block up the city of London where the queen resided. At the same time measures were taken to intrigue the Londoners to a revolt, and to seize the queen's person. Matilda, having timely notice of this conspiracy, fled to Winchester. Here she was soon after besieged by the bishop; but the town being distressed by famine, she with difficulty made her escape; while her brother the Earl of Gloucester, endeavouring to follow, was taken prisoner, and exchanged for Stephen.

Matilda was now obliged to take shelter in Oxford, while Stephen reappeared the thrice. The civil war broke out with redoubled fury. Many battles were fought, and both parties were involved in many disasters. Matilda escaped from Oxford at a time when the fields were covered with snow, by being dressed all in white, with four knights her attendants dressed in the same colour. Another time Stephen was surprised by the earl of Gloucester at Wilton, and made his escape with the utmost difficulty. At last Matilda was obliged to quit the kingdom; and the death of the earl of Gloucester soon after seemed to give a fatal blow to her interests. In 1153, however, prince Henry, Matilda's son by her second husband Geoffrey, came over to England, in order once more to dispute Stephen's pretensions to the crown. After some successes on his first landing, he was opposed by Stephen with a powerful army, and matters seemed likely to come to the decision of a general engagement. But while the two armies continued within a quarter of a mile of each other, a treaty was set on foot by the interposition of William earl of Arundel, for terminating the dispute in an amicable manner. The death of Eustace, Stephen's son, by whom he had designed for the throne, which happened during the course of the treaty, facilitated its conclusion. It was agreed, that Stephen should resign during his life, and that justice should be administered in his name; that Henry, on Stephen's death, should succeed to the kingdom; and that William, Stephen's son, should inherit Boulogne and his paternal estate. This treaty filled all Europe with joy; and after the bars had sworn to it, Henry left England, and Stephen returned to the peaceful enjoyment of his throne. His reign, however, was but of short continuance; his death happening on the 25th of October 1154.

Henry was on the continent besieging a castle of one of the mutinous barons, when news was brought him of Stephen's death. But, as he was sensible of the goodness of his title, he did not abandon his enterprise till the place was reduced. He then set out on his journey, and was received in England with the utmost joy. The first acts of his reign seemed to promise an Henry II. happy and prosperous administration. He instantly dismissed the mercenary soldiers who had committed the greatest disorders throughout the nation. He ordered all the castles which had been erected since the death of Henry I. to be demolished, except a few which he retained in his own hands for the protection of the kingdom. The adulterated coin which had been struck during the reign of Stephen was cried down, and new money struck of the right value and standard. He reformed many of those benefactions which had been made to churches and monasteries in the former reigns. He gave charters to several towns, by which the citizens claimed their freedom and privileges independent of any superior but himself. These charters were the ground-work of the English liberty; for thus a new order, namely, the more opulent of the people, began to claim a share in the administration, as well as the nobility and clergy. Thus the feudal government was at first impaired; and liberty began to be more equally diffused throughout the nation.

Henry II. on his accession to the English throne, found himself possessed of very extensive dominions on the continent. In the right of his father, he possessed Anjou, Toulouse, and Maine; in that of his mother, Normandy; in that of his wife, Guienne, Poitou, Xaintraigne, Anjou, Perigord, Angoumois, and the Limousin. Soon after, he annexed Brittany to his other states, by marrying his son, who was yet a child, to the heiress of Brittany, who was a child...
England, also, and was already in possession of the superiority over that province. These territories comprised above a third of the French monarchy, and were by far the most opulent part of it; so that Henry, though subject to the king of France, was greatly superior to him in power: and when England was added to all these, the French king had great reason to apprehend some disaster to himself and family. The king of England, however, refrained at too great a distance to be able to employ his formidable power with success against the French monarch. He soon became a kind of stranger in his continental dominions; and his subjects there considered their allegiance as more naturally due to their superior lord, who lived in their neighbourhood, and who was acknowledged to be the supreme head of their nation. Their immediate lord was often at too great a distance to protect them; and a communion in any part of Henry's extensive dominions gave great advantages against him. The wife and vigorous administration of Henry, however, counterbalanced in a great measure these disadvantages; and he maintained a surprising tranquillity throughout his extensive dominions during the greatest part of his reign.

Henry found no great difficulty in circumventing the power of the barons; but when he attempted to do the same thing with the clergy, he met with the most violent opposition. That body had carried their independence on the civil power so far, that now they seemed to aim at nothing less than a liberty to commit all manner of crimes with impunity. During the reign of Stephen, they had extorted an immunity from all ecclesiastical penalties; and that grant they were resolved to maintain for the future. It may easily be supposed, that a law which thus fermented their wickedness, contributed to increase its prevalence; and we accordingly find upon record, not less than 100 murders committed by men in holy orders in the short period since the king's accession, not one of which was punished even with degradation; while the bishops themselves seemed to glory in this horrid indulgence. The king did not make any attempts against them during the life of Theobald archbishop of Canterbury, who was a man of a mild character, and besides had great merit; because, during the former reign, he had refused to put the crown on the head of Euface, Stephen's son. He died in 1162; and the king, after his death, advanced to the see of Canterbury Thomas a Becket, his chancellor, on whose compliance he thought he might entirely depend.

The new archbishop was the first man of English pedigree, who, since the Norman conquest, had risen to any considerable station. Before his installation in the see of Canterbury, Becket had been exceedingly complaisant, good-humoured, and agreeable to his master; and had also been accustomed to live very freely. But no sooner was he invested with this high dignity, than he totally altered his conduct, and put on all those airs of affected and ostentatious humility which could recommend him to the supercilious and ignorant multitude in that age. The first step taken by this hypocrite after his advancement, was to resign the office of chancellor. This he did without consulting the king; the reason he gave was, that henceforth he must detach himself from secular affairs, and be solely employed in the duties of his sacred function; but in reality, that he might break off all connexion with Henry. As he knew that the king intended to abridge the ecclesiastical power, he thought the best method would be to become himself the aggressor. He therefore summoned the earl of Clare to surrender the barony of Tunbridge; which, ever since the Conquest, had remained in the family of that nobleman; but which, as it had formerly belonged to the see of Canterbury, the primate pretended that his predecessors were prohibited by the canons from alienating.—William de Eynsford, a military tenant of the crown, was patron of a living which belonged to a manor that held of the archbishop of Canterbury; and Becket, without regard to William's right, pretented, on a new and illegal pretence, one Laurance to that living, who was violently expelled by Eynsford. Upon this, Eynsford was excommunicated. He complained to the king, that he, who held in capite of the crown, should, contrary to the practice established by the Conqueror and maintained ever since by his successors, be subjected to that terrible sentence, without the previous consent of the sovereign. Henry, by a messenger, commanded Becket to absolve Eynsford. The haughty primate answered, that it belonged not to the king to inform him whom he should absolve, and whom he should communicate; but, after all, he was obliged to comply with the king's orders, though with the worst grace imaginable.

As Henry perceived that the crown was now in danger, through the usurpation of the people, of falling totally under the power of the clergy, he resolved to exert himself to the utmost against their scandalous usurpations. Among their other inventions to obtain money, they had now inculcated the necessity of penance as an atonement for sin; and having again introduced the practice of paying them large sums as an equivalent for these penances, the sins of the people had thus become a revenue to the priests; and the king commanded, that, by this invention alone, they levied more money from his subjects than what flowed by all the funds and taxes into the royal exchequer. To cull the people of so heavy and arbitrary an imposition, the king required, that a civil officer of his appointment should be present in all ecclesiastical courts, and should for the future give his consent to every composition made for spiritual offences. About this time also the king had an opportunity of proceeding against the clergy on another footing. A clerk in Worcestershire, having debauched a gentleman's daughter, murdered her father. The lady required that the clerk should be delivered up to the magistrate. Becket pleaded the privileges of the church; confined the criminal in the bishop's prison, left he should be seized by the king's officers; and maintained that no greater punishment could be inflicted on him than degradation. The king then required, 'that, immediately after he was degraded, he should be tried by the civil powers; but the primate asserted, that it was iniquitous to try a man twice upon the same accusation, and for the same crime. Upon this, Henry, summoned an assembly of all the prelates in England; and put to them this decisive question, Whether or not they were willing to submit to the ancient laws and customs of the kingdom? The bishops unanimously replied, that they were willing, saving their own order. The king was pro-
England. provoked to the last degree at this equivocal answer. He left the assembly with evident marks of difpleasure; and required the primate instantly to surrender the caftles of Eye and Berkham. The other prelates were terrified; but Becket continued inflexible; however, he was at last prevailed upon, by the interposition of the pope's legate and almoner, to retract the faving clause, and promife without any re-serve to observe the ancient customs.

The king was not now to be satisfied with general promifes from the clergy. He was determined that the ancient laws and customs should be defined, as well as the privileges of the clergy. He therefore summoned another great council of the clergy and nobility at Clarendon, to whom he submitted this important affair. A number of regulations was there drawn up, which were afterwards well known by the title of the Constitutions of Clarendon. By these it was enacted, that clergymen accused of any crime should be tried in civil courts; that laymen should not be tried in spiritual courts, except by legal and reputable witnesses; that the king should ultimately judge in ecclesiastical and spiritual appeals; that the archbishops and bishops should be regarded as barons, and obliged to contribute to the public expences like other persons of their rank; that the goods forfeited to the king, should not be protected in churches or churchyards by the clergy; and that the sons of villains should not take orders without the consent of their lord. These, with some others of like consequence, to the number of 16, were subscribed by all the bishops present, and even by Becket himself; who, at first showed no reluctance.

Nothing now remained but to get the constitutions ratified by the Pope; but in this the king was disappointed. The Pope rejected them with the utmost indignation, and out of 16, admitted only six, which he thought were not important enough to deserve censure.—Becket was now mortified to the highest degree. He retracted his confent to the constitutions, redoubled his affinities, and even refused to execute any part of his facerical function till he had obtained abjuration from his holiness. Henry, considering these humiliations as insults offered to himself, defied the Pope to send him a legate. He did so; but annexed a clause to his commission, by which he was prohibited from acting against the archbishop of Canterbury. The king sent back the commission to the Pope; and being now exasperated beyond all patience, commenced furious prosecutions against Becket. He first sued him for some lands belonging to his priory; and Becket being detained by fiefs and challes from coming into court, his non-attendance was construed into dereliction. The primate afterwards defended his cause in person; but all his goods and chattels were confiscated, and the bishop of Winchester was obliged to pronounce the sentence. Another suit was commenced against him for L. 300, which he had levied on the honours of Eye and Berkham, and the primate agreed to give securities for the payment of the sum. The next day a third suit was commenced against him for 1000 marks, which the king had lent him upon some former occasion: and immediately upon the back of these, a still greater demand was made; namely, that Becket should give an account of the money he had received and expended during the time he was chancellor. The money was computed at no less than 40,000 marks; and the primate, unable either to give an account, or find securities, took the following extraordinary method of evading the king's designs. He arrayed himself in his episcopal vestments; and with the crofs in his hand, went forward to the royal apartments, held up the crofs as his banner and protection. The king, who was in an inner apartment, ordered by proclamation all the prelates and nobility to attend him; to whom he loudly complained of Becket's insolence. The whole council joined in condemning this instance of his unaccountable pride; and determined to expel him from among the consitutions of Clarendon. But all their muf­fages, threats, and arguments, were to no purpose. Becket put himself, in the most solemn manner, under the protection of the supreme pontiff; and appealed to him against any penalty which his inquisitive judges might think proper to inflict. Then leaving the pa­lace, he asked the king's immediate permission to quit Northampton; but being refused, he secretly withdrew in disguise, and at last found means to cross over to the continent.

Becket was received with the greatest marks of esteem, firft by the king of France (who hated Henry on account of his great power), and then by the Pope, whose caufe he had fo strenuously defended in England. Henry at the fame time sent ambassadors to the Pope, who were treated with coolnefs and contempt, while Becket was honoured with the greatest marks of distinction. These favours bellowed upon an exile and a perjured traitor (for such had been Becket's sentence of condemnation in England), irri­ated the king to such a degree, that he resolved to throw off at once all dependence upon the Pope. He accordingly issued out orders to his juficiary; inhibiting, under severe penalties, all appeals to the Pope, or the archbishop; and forbidding any of them to receive mandates from them, or to apply to their authority. He declared it treasonable to bring over from either of them any interdict upon the kingdom. This he made punishable in secular clergymen by the los of their livings, and by castration; in regulars, by the amputation of their feet; and in laymen, by death. On the other hand, the Pope and the archbishop did not fail to induce forth their fulminations in such a manner as to shake the very foundation of the king's authority. Becket ex­communicated by name all the king's chief ministers who had been concerned in fequestrin the revenues of his fee, and all who obeyed or favoured the con­stitutions of Clarendon. He even threatened to excom­municate the king if he did not speedily repent; and had not the Pope himself been threatened every day with the machinations of an antipope, whose preten­sions he was afraid the king of England might support, the sentence of excommunication would certainly have been denounced.

At first Henry paid little regard to these fulminations; but afterwards, when he found that his authority over his subjects began to decline on that account, and that his rivals on the continent were endeavouring to disturb the tranquillity of his dominions, he began sincerely to desire a reconciliation. This the Pope and Becket
Becket also became dolorous, because they saw that their utmost endeavours were insufficient to draw Henry's subjects into a revolt against him. The treaty of accommodation, however, was often broken, through the extreme jealousy of each of the parties; but at length by the mediation of the Pope's legate, all differences were adjusted, and Becket was reinstated in the see of Canterbury.

On the recovery of his dignity, the primate behaved with all his usual arrogance. Instead of retiring quietly to his diocese when he landed in England, he made a progress through Kent with all the splendor and magnificence of a sovereign pontiff. As he approached Southwark, the clergy, the laity, and all ranks of people came forth to meet him, and celebrated his triumphal entry with hymns of veneration. He suspended the archbishop of York, who had condemned Henry's eldest son in his absence. He excommunicated the bishops of London and Salisbury, with some of the principal nobility and prelates who had adhered at the coronation. One man, he excommunicated for having spoken against him, and another for having cut off the tail of one of his horses. The excommunicated and degraded prelates immediately made their complaints to the king; and he having dropped some passionate expressions, intimating a desire to have Becket's life taken away, the supposed will of the king was instantly accomplished; nor could the king's express orders to the contrary arrive in time enough to hinder the execution of this fatal purpose. See Becket.

The king was thrown into the utmost consternation on hearing of Becket's murder. He knew that the primate's death would accomplish what his most violent opposition during his life could never have done, and therefore he gave himself up to sorrow; for three days he even refused all nourishment; till at last his courtiers were obliged to break in upon his solitude, and induce him to acquiesce in an event which could not possibly be recalled. The pope was with some difficulty made sensible of the king's innocence; but refused to grant him a pardon, except on condition that he should make every future submission and perform every injunction the holy see thought proper to demand. When things were thus adjured, the affaiitans who had murdered Becket were allowed to retire in safety to the enjoyment of their former dignities; and the king, with a view to divert the minds of the people to a different object, undertook an expedition into Ireland, and totally reduced that island. See Ireland.

The king was fearfully freed from the war with Ireland, and the dangerous controversy which he had engaged in with the church of Rome, when he found himself involved in the most unnatural contencis with his children, to whom he had always behaved in the most tender and affectionate manner. He had ordered Henry his eldest son to be anointed king; and had defined him for his successor in the kingdom of England, the duchy of Normandy, and the counties of Anjou, Maine, and Touraine; territories which lay contiguous, and which might thus easily lend their assistance to one another. Richard his second son was invested in the duchy of Guisene and county of Poitou: Geoffrey, his third son, inherited, in right of his wife, the duchy of Brittany: and the new conquest of Ireland was assigned for the appendage of John his fourth son, for whom he had negotiated a marriage with Adelais the only daughter of Humbert count of Savoy and Maurienne; and with whom he was to receive as a dowry very considerable demesnes in Piedmont, Savoy, Breifte, and Dauphiny. This greatness of Henry's family alarmed the king of France; and he therefore excited young Prince Henry to demand of his father, either the immediate resigna-

The king refused to comply with such an extravagant demand; upon which the prince made his escape to Paris, where he was protected by the French king. This happened in 1173; and the same year, queen Eleanor, finding that she was now grown very disagreeable to the king, communicated her discontent to her two younger children Geoffrey and Richard, whom she engaged also to demand the territories assigned them, and then fly to the court of France. The queen herself was meditating an escape to the same court, and had put on man's apparel for that purpose, fixed, when she was seized and confined by Henry's order. The licentious barons in the mean time wished for a change of government; hoping to have liberty, under young and inexperienced princes, to commit those raptures and violations which they could not do with safety when governed by such a prudent and vigilant king as Henry. In the midst of this universal defection, however, the English monarch still retained his usual intrepidity, and prepared with as much vigour as possible for the contest. As he could depend on the fidelity of very few of his nobility, he was obliged to enlist in his service a number of desperate ruffians called Brabentious, and sometimes Routiers or Cottereaus, though for what reason is not mentioned in history. These banditti were very numerous during the times of the feudal government, when many private wars were carried on between the nobles; and 20,000 of these, with a few forces furnished by his faithful barons, composed the whole of Henry's army on this occasion.

With this force the king of England totally overthrew the schemes of his enemies on the continent; but being very dolorous of putting an end to the war, he this very year (1173) agreed to a conference with the king of France. At this interview, Henry offered his children the most advantageous terms. He insisted only on retaining the sovereign authority in all his dominions. To Henry he offered half the revenues of the crown of England, with some places of security in that kingdom; or if he chose rather to reside in Normandy, half the revenues of that duchy, with all those of Anjou. He made a like offer to Richard in Gui
dene; he promised to resign all Brittany to Geoffrey; and if these concessions were not deemed sufficient, he agreed to add to them whatever the Pope's legates, who were present, should require of him. The conference, however, was broke off by the violence of the earl of Leicester; who not only reproached Henry in the most indecent manner, but even put his hand to his sword, as if he intended to attempt some violence against him.
In the mean time, the most of the English nobility united in opposition against their sovereign: and an interruption at this time by the king of Scotland affrighted their rebellious schemes. The earl of Leicester soon after invaded Suffolk at the head of a body of Flemings: but they were repulsed with great slaughter, and the earl himself was taken prisoner. Soon after, William king of Scotland, who had been repulsed, and agreed to a cessation of arms, broke the truce, and invaded England with an army of 80,000 men, committing the most terrible devastations. Henry in the mean time, to reconcile himself thoroughly to the church, performed the penances at the tomb of Thomas a Becket which he had formerly promised to do. As soon as he came within sight of the church of Canterbury, he alighted from his horse, walked barefoot towards the town, and prostrated himself before the shrine of the saint. He remained a whole day in prayer and fasting, watched the holy relics all night, made a grant of 30l. a-year to the convent for a constant supply of tapers to illuminate the shrine; and not satisfied with these submissions, he assembled a chapter of monks, dispersed himself before them, put a scourge into each of their hands, and presented his bare shoulders to their strokes. Next day he received ablution; and, departing for London, had the agreeable news of the defeat and captivity of William king of Scotland, which happened on the very day of his abolition.

This victory proved decisive in Henry’s favour. The English barons who had revolted, or were preparing for a revolt, instantly delivered up their castles to the victor, and the kingdom was in a few weeks restored to perfect tranquility. Prince Henry, who was ready to embark with a great army to join the English rebels, abandoned all thoughts of the enterprise. Soon after a treaty was concluded with the king of France; in which Henry granted his children men lef advantageous terms than he had offered them before. The principal were, some pensions for their support, castles for their residence, and an indemnity to all their adherents. The greatest sufferer by this war was William king of Scotland. He was compelled to sign a treaty, by which he obliged himself to do homage to Henry for the kingdom of Scotland. It was agreed, that his barons and bishops should do the same; and that the fortresses of Edinburgh, Sterling, Berwick, Roxburgh, and Jedburgh, should be delivered into the hands of the conqueror till the articles were performed. This treaty was executed most punctually and rigorously, on the tenth of August 1175. The king, barons, and prelates of Scotland, did homage to Henry in the cathedral of York: the greatest humiliation to which the Scottish nation had ever been subjected.

Henry was now freed from all troubles either at home or abroad, for five years; during which time he made several salutary laws for the good of his kingdom. But, in 1180, the ambitious spirits of his children involved him in fresh calamities. Richard, who had been involuted by his father with the sovereignty of Guienne, refused to do homage to his elder brother, as king Henry had required him to do. Young Henry and Geoffrey, uniting their arms, invaded their brother’s dominions; and while the king was endeavouring to compose their differences, he found himself inspired against them all. The conspiracy, however, was defeated by the death of prince Henry in 1183. He had retired to Martel, a castle near Turcet, and perceiving the approaches of death, he was at last struck with remorse for his unprofitable behaivour towards his father. He sent a messenger to the king, who was not far distant; expressed his contrition for his faults; and intreated the favour of a visit, that he might at least die with the satisfaction of having received his forgiveness. The king, who had so often experienced his son’s ingratitude and violence, apprehended that his sickness was entirely a feint, and dared not trust himself in the prince’s hands. But soon after, receiving certain intelligence of his death, and proofs of his sincere repentance, the good old king was affected with the deepest sorrow. He thrice fainted away; he accused his own hard-heartedness in refusing the dying request of his son; and he lamented that he had deprived the prince of the last opportunity of making amends for his offences.

Prince Henry, who died in the 28th year of his age, left no politerly. His brother Richard succeeded to his dominions, and soon discovered as turbulent a spirit as that which had actuated his brother. He refused to give up Guienne, which Henry had designed for his fourth son John; and even made preparations for carrying on war against his father, and brother Geoffrey. Henry sent for Eleanor his queen, the heiress of Guienne; to whom Richard, either dreading an insurrection in her favour, or out of a sense of duty, willingly yielded up the territory, and retired peaceably to his father’s court. This breach, however, was no sooner made up, than Geoffrey, demanded Anjou to be added to his dominions in Brittany. This the king refused; upon which he fled to the court of France, and prepared to levy an army against his father. Henry, however, was freed from the danger which threatened him from that quarter, by his son’s death, who was killed in a tournament at Paris. The loss of this prince gave few, except the king himself, any uneasiness; for he was universally hated, and went among the people by the name of the Child of Perdition. The widow of Geoffrey, soon after his decease was delivered of a son, who received the name of Arthur, and was invested in the duchy of Brittany, under the guardianship of his grandfather, who as a Duke of Normandy, was also superior lord of that territory. Philip, as lord paramount, disputed for some time his title to this wardship; but was obliged to yield to the inclinations of the Bretons, who preferred the government of Henry. Some other causes inflamed the dissension between these two monarchs, and Philip once more seduced Richard from his duty. He insinuated, that his marriage with Adelais, Philip’s sister, should be immediately completed, and threatened to enforce his pretensions with a formidable army. This occasioned another conference between Gisors and Trie, the usual place of meeting, under a vast elm that is said to have shaded more than an acre. In the midst of this conference the archbishop of Tyre appeared before the assembly in the most miserable habit, and begged assistance against the infidels, who, under Saladin, had almost totally expelled the Christians from Asia. His intelligence
England had at last arms against its enemies in France and England. The treaty was renewed, and the marriage of Richard and Isabella, the daughter of Edward I, was arranged. However, the peace was short-lived, and Richard soon found himself embroiled in the affairs of France and Scotland.

Richard's expeditions were marked by cruelty and bloodshed. He was accused of tyranny and oppression, and his actions were condemned by the Pope. The situation in England was also destabilized by Richard's presence, and his return was expected with great hostility.

Richard's return to England was met with resistance, and a council of nobles was convened to discuss the situation. The council decided to accept Richard as king, but only on certain conditions. Richard agreed to these terms, and his coronation took place in Westminster Abbey.

Richard's reign was marked by conflict and intrigue. He was constantly at odds with his barons and the Church, and his policies were often contradictory. Nevertheless, he managed to maintain his power and influence, and his reign saw the rise of the Tudor dynasty.

Richard's final years were marked by illness and financial crisis. He tried to raise funds for his expeditions by taxing the clergy and the nobility, but his efforts were unsuccessful. In 1503, Richard died in battle at the Battle of Poitiers, leaving the English crown to his son Henry VII.
England at the siege of Acres (the ancient Ptolemais), where having received some dignity, he took this base method of revenging himself. Henry VI. emperor of Germany, was then equally an enemy to Richard on account of his having married Berengaria the daughter of Tancred king of Sicily. He therefore required the royal captive to be delivered up to him, and stipulated a large sum of money to the duke as a reward for his service.

The kingdom of England in the mean time was in great confusion. Richard had left it under the direction of Hugh bishop of Durham, and Longchamp bishop of Ely. The tempests of these prelates being very different, an animosity between them soon took place. Longchamp at last arrested his colleague, and obliged him to resign his power in order to obtain his liberty. The king, by many letters, commanded Longchamp to replace his coadjutor, but to no purpose. When the situation of the king became uncertain, Longchamp prevailed to such a degree, that John the king's brother thought proper to oppose him. He then left the kingdom; and upon this the archbishop of Rouen was made junctuary in his room.

The king of France being informed of these divisions, strove to increase them as much as possible; and had even almost prevailed upon John to throw off his allegiance, by promising to put him in possession of all Richard's continental dominions.

When the English first received the news of Richard's captivity, a general indignation was excited through the whole nation. The greatest, and almost the only traitor in the kingdom, was the king's own brother John. On the very first invitation from the court of France, he went abroad; and held a consultation with Philip, the object of which was the perpetual ruin and captivity of his unhappy brother. He promised to deliver into Philip's hands a great part of Normandy; and, in return, he received the investiture of all Richard's tranmarine dominions: it is even said, that he did homage to the French king for the crown of England.

In consequence of this treaty, Philip invaded Normandy, and made considerable progress in the conquest of it. He was, however, at last repulsed by the Earl of Leicesters, who was now returned from the Holy Land; and a truce was concluded on condition of paying the French king 20,000 marks, and putting four castles into his hands by way of security for the payment.—John, who had come over to England, met with still less success in his enterprises. He was only able to make himself master of the castles of Windsor and Wallingford; but when he came to London, and demanded the kingdom as heir to his brother, of whose death he pretended to have received certain intelligence, he was rejected by all the barons, and meafures were taken to oppose and subdue him. The defence of the kingdom was so well provided for, that John, after some fruitless efforts, was obliged to conclude a truce with his opponents; and, before the expiration of it, he thought proper to retire to France, where he openly acknowledged his alliance with Philip.

All the efforts of Richard's enemies proved ineffectual to detain him in captivity. He was brought before the diet of the empire at Worms, where the emperor Henry brought against him a charge of many crimes and misdemeanors: but to this thicken replied with so much spirit and eloquence, that the German princes exclaimed loudly against the conduct of the emperor; the Pope threatened him with excommunication; and Henry, who had harkened to the proposals of the king of France and prince John, found that it would be impossible for him to execute his and their base purposes, and detain the king of England any longer in captivity. He therefore concluded a treaty with him for his ransom; and agreed to restore him to his liberty for 150,000 merks, about L. 300,000 sterling, of which 100,000 merks were to be paid immediately, and 67 hostages delivered for the remainder.

The money for the king's ransom was most cheerfully raised by the English. The churches and monasteries melted down their plate to the amount of 70,000 merks; the bishops, abbots, and monks, paid a fourth part of their yearly rent; the parochial clergy contributed a tenth part of their tithes; and the requisite sum being thus collected, queen Eleanor and Walter archbishop of Rouen, set out with it for Germany. Philip paid the money to the emperor and duke of Austria at Menz, delivered them hostages for the remainder, and freed Richard from his captivity. His escape was very critical. Henry had been detected in the assassination of the bishop of Liege, and in an attempt of the like nature on the duke of Louvain; and finding himself extremely obnoxious to the German princes on account of these odious practices, he had determined to seek support from an alliance with the French king, and to detain Richard in perpetual captivity, notwithstanding the sum he had already received for his ransom. He therefore gave orders that Richard should be purified and arrested: but the king making all imaginable haste, had already embarked at the mouth of the Scheldt, and was out of sight of land when the emperor's messengers reached Antwerp. The king of France no sooner heard of Richard's deliverance, than he wrote to John his confederate in these terms: "Take care of yourself: the devil is broke loose."

The king of England returned from captivity on Returns to the 20th of March 1194, and was received with the utmost joy by his subjects. He had been but one day landed, when his treacherous brother John came to make his submission. At the intercession of queen Eleanor he was received into favour. "I forgive him (said the king), and hope I shall as easily forget his offences as he will my pardon." Richard was impatient to revenge himself on the king of France, and therefore instantly made war upon him. But though both kings were inflamed with the most violent resentment against each other, they found it impossible to engage their powerful barons heartily in their cause.

The war, therefore, produced no remarkable event; and, in 1195, was concluded by a truce for five years. On some slight occasion it was ready to break out anew, when the pope's legate intercepted, and a treaty was about to be concluded. King Richard in the mean time was wounded by an arrow at the siege of Chalus, a castle of Limoges. The wound was not in itself dangerous; but being unskillfully treated, a mortification ensued, and the king expired on the 6th of April 1199, in the 10th year of his reign and 42d of
John succeeded to the crown of England without opposition, but soon found his affairs embattled on all sides. The king of France, who, during the life of Richard, had always supported the pretensions of John, now gave a like support to the claims of prince Arthur the son of Geoffrey, who, though only 12 years of age, promised to be deserving of the kingdom. But in this matter the king of France showed so much regard to his own interest, that Constancia, the mother of the young prince, thinking that her ally designed to keep for himself the provinces which he pretended to conquer for Arthur, submitted herself and her son to John, who detained them in Mans; and thus became undisputed master of the whole empire.

The new king was weak, tyrannical, cruel, and treacherous. In short, he seemed to be endowed with almost every bad quality that can fall to the share of man. His conduct, therefore, soon rendered him universally odious. Imagining himself now secure on the side of France, he indulged his passion for Isabella, the daughter and heiress of the count of Angouleme, with whom he was much enamoured. His queen, the heiress of the family of Glocester, was still alive; and Isabella was married to the count de la Marche, ‘tho’, by reason of her youth, the marriage had not been convalidated. John perjured the count de Angouleme to carry off his daughter from her husband; at the same time that he procured, under some pretence or other, a divorce from the queen. Thus he incurred the displeasure of the pope, and also of the count de la Marche, and a powerful confederacy was formed against him.

As John had neither courage nor policy sufficient to keep his barons in awe, he took a method for that purpose equally base and cruel. This was by hiring a set of ruffians, whom he called his champions, to fight duels with them, in cafes where they required to clear themselves from any charge by fighting a duel, according to the custom of those times. Thus he proposed to get rid of his refractory barons: but they, despising opponents who were so far below their rank, refused to fight with them, and a dangerous combination was formed among the barons against him.

The murder of prince Arthur rendered John still more generally detested. The young prince with his mother had fled to the court of France, where they were received with the greatest kindness, and found their interests more vigorously supported than before. Their enterprises were attended with considerable successes, when Arthur himself had the misfortune to be taken prisoner. All the other captives were sent to England; but the prince was shut up in the castle of Falaise, and from that time was never heard of. It was universally believed that John had murdered him with his own hand; and this inflamed the general resentment against him to such a degree, that he soon after left all his French provinces. In 1207, the duchy of Normandy itself was also conquered by Philip, and John was forced to fly with disgrace to England.

The king was resolved to wreak his vengeance upon the barons, who, he pretended, had defeated his standard in Normandy. For this reason, he levied large sums on their estates; in order, as he said, to undertake an expedition to the continent. This expedition however, he several times capriciously deferred; and once having ventured out to sea, returned again without making the smallest attempt. At last, he landed at Rochelle, and burnt the city of Angiers; but hearing that the enemy were preparing to oppose him, he returned without attempting anything else.

This irreligious and cowardly behaviour of John made him contemptible in the eyes of his subjects; but the Norman princes had so far extended the prerogatives of the English crown, that the barons, however discontented, durst not attempt to change the form of government. John, by entering into a controversy with the church, completed his ruin. The clergy, who for some time had acted as a community totally independent of the king, now gave a like support to the claims of his son and heir. The election of archbishops, however, had been a subject of continual dispute between the suffragan bishops and the Augustinian monks. In the mean time the archbishop of Canterbury died; and the Augustinian monks, in a very private manner, elected Reginald, their superior, in his place. The bishops exclaimed against this election, as a manifest innovation of their privileges; and a furious theological contest was likely to ensue. John very imprudently took a side in this controversy, and espoused the cause of the suffragan bishops; in consequence of which, John de Grey bishop of Norwich was chosen. The cause was appealed to Rome; and Pope Innocent III., desiring with avidity an opportunity of extending his power, commanded the monks to choose cardinal Stephen Langton, an Englishman, then at the court of Rome. The being able to nominate an archbishop of Canterbury (a person of almost equal authority with the king), was an acquisition that would effectually give the court of Rome an unlimited authority over England. John therefore was resolved not to submit to this imposition; but he had not judgment sufficient to conduct himself. He violently expelled the monks from their convent, and seized upon their revenues. The pope, perceiving from this absurd conduct, that John was unequal to the task he had undertaken, after some intreaties, threatened to put the whole kingdom under an interdict. The prelates threw themselves on their knees before the king, in the most earnest manner intreated him to avoid the resentment of the holy tribunal, by receiving the primate, and restoring the monks to their convent. John, however, broke out into the most violent invectives. He swore by God’s teeth (his usual oath), that if the kingdom was put under an interdict, he would banish the whole body of the clergy, and confiscate all their possessions. The pope at last, finding he might do it with safety, issued forth this terrible sentence so much dreaded by the whole nation. A stop was immediately put to divine service, and the administration of all the sacraments except baptism. The church-doors were shut, and under an interdict, all the images of the saints laid on the ground. The dead were refused Christian burial; and were thrown into ditches and on the highways, without any funeral solemnity. Marriage was celebrated in the churchyards, and the people prohibited the use of meat as in times...
The king's excommunication, and the kingdom given to Philip of France.

The king, enraged at this behaviour of the pope, and resolved to execute his project of conquering England, in spite of him and all his censures. His fleet, however, was attacked in its harbours by the English, who took 300 vessels, and destroyed about 100 more; while Philip, finding it impossible to prevent the rest from falling into the hands of the enemy, set fire to them himself, and thus was obliged to give up all hopes of success.

John being thus freed from all danger, continued to follow the same cruel and tyrannical measures which attempt to hitherto rendered him odious to his subjects. His scandalous subjection to the clergy, now gave the barons an opportunity of exercising themselves, in order to reduce the enormous prerogatives of the crown. Their designs were greatly facilitated by the concurrence of Langton the primate, who on all occasions showed a sincere regard for the interest of the kingdom. At a synod of his prelates and clergy, convened in St. Paul's, on pretence of examining into the lots of some bishops who had been exiled by John, he privately conferred with a number of barons, to whom he expatiated on the vices and injustice of their sovereign. He showed them a copy of Henry the First's charter; (being the only one in the kingdom, and which had been buried in the rubbish of an obscure monastery.) Langton exhorted the barons to insist on a renewal of it; and this they solemnly swore to perform. The same agreement was afterwards renewed at a more numerous meeting of barons summoned by Langton at St. Edmondsbury. Here it was resolved, that at Christmas they would prefer their common petition in a body; and in the mean time they separated with a design to put themselves in a posture of defence, enlist men, and fortify their castles. In the beginning of January 1215, they repaired to London, accousted in their military garb and equipage, and prefented their petition to the king, alleging that he had promised to grant a confirmation of the laws of Edward the Confessor, at the time he was abjured from his excommunication. John referred their presumption; and required a promis under their hands and seals, that they would never demand, or attempt to extort, such privileges for the future. This they refused with such unanimity and resolution, that the king desisted to consider of their demands. He promised, that, at the festival of Easter, he would give a positive answer to their petition; and ordered them the archbishop of Canterbury, the bishop of Ely,
England. Ely, and the earl marechal, as fortices for fulfilling his engagements.

The barons accepted of his securities, and departed peaceably; but John had no design of complying with their dehires. He had recourse to the clergy, whose power he had seen and felt in so many instances. He courted their favour, by granting them a charter establishing all those rights of which they were already in the possession, and which he now pretended to confirm when he had not the liberty to refuse. To ingratiate himself still farther with this body, he took the cross, and appealed to the pope against the usurpation of the barons. The pope wrote letters to England, reproaching the primate and bishops with favouring these dissensions; and commanded them to promote peace between the two parties. He exhorted the barons to conciliate the king, not with menaces, but with humble intreaties: and promised, upon their obedience, to interpose his own authority in favour of such of their petitions as he should find to be just. At the same time he annulled their association, and forbade them to enter into any confederacy for the future.

This baron paid no regard to the pope’s remonstrances; knowing that the fulminations of the court of Rome would be of little avail, unless they were seconded by the clergy of England. After waiting till Easter, when the king promised to return them an answer, they met by agreement at Stamford. There they assembled a force of above 2000 knights, and a prodigious number of foot. Thence they marched to Brackley, about 15 miles from Oxford, the place where the court then reigned.

John, hearing of their approach, sent the archbishop of Canterbury, the earl of Pembroke, and others of his council, to know the particulars of their request, and what those liberties were which they so much importuned him to grant. The barons delivered a schedule containing the chief articles of their demands, founded on the charters of Henry and Edward; but which were in the highest degree displeasing to the king. He burst into a furious passion, asked the barons why they did not also demand his kingdom, and swore that he would never comply with such exorbitant demands. The confederates then chose Robert Fitzwalter for their general; whom they dignified with the title of “Marechal of the army of God and of the holy church.” They laid siege to Northampton, took Bedford, and were joyfully received into London. They wrote letters to all the nobility and gentry who had not yet declared in their favour, threatening their exiles with devastation in case of refusal or delay.

In the mean time the king was left at a place called Oxford in Surrey, attended only by seven knights. He vainly endeavoured to aver the iorm of the mediation of his bishops and ministers. He appealed to Langton against the barons, not suspecting that he was engaged in the confederacy; and desired him to fulminate the church-censures against those who had made war upon their lawful prince. Langton declared that he would pafs no censure where he found no delinquency; but said, that much might be done if the king would dismiss some foreign auxiliaries which he had lately brought over. Upon this John disbanded a great body of Germans and Flemings whom he had hitherto retained in his service, and Langton refused to excommunicate a single baron. The king, being now quite defenceless, was obliged at last to comply with the demands of his subjects. A conference was accordingly appointed, and all things were adjusted for this most important treaty.

The king’s commissioners met the barons at a place called Runimede, between Staines and Windsor; and he signed which is yet held in reverence as the spot where the standard of freedom was first erected in England. Here the king signed the charter called Magna Charta; which continues in force to this day, and is still regarded as the great bulwark of British liberty. See Magna Charta.

This charter, however, at the time that it was made, secured liberty to the clergy, barons, and gentlemen, much more than to the bulk of the people, who did not for a long time obtain any privileges of importance. Freedom of elections was secured to the clergy; and it was determined, that fines on them for any offence should be laid on in proportion to their estates, and not the value of their benefices. The privileges secured to the barons were, either abatements in the rigour of the feudal laws, or relief from arbitrary and ambiguous decisions before the courts. It was also decreed, that barons should recover the lands of their valets, even though forfeited by felony, after having been in the possession of the crown for a year and a day; and no tax was to be imposed without consent of the great council of the nation, excepting in case of the captivity of the king, the knightings of his eldest son, or marrying his eldest daughter. No land belonging to any baron was to be seized for a crown debt, unless the poiffessor had not personal property enough to pay it; neither was any vassal to be allowed to fall to much of his land as to incapacitate him from performing the necessary service to his lord. It was also determined, that when the great council of the nation was called, the prelates, earls, and barons, should be summoned by a particular writ, and the lesser barons should receive a summons from the sheriff. In favour of the people it was stipulated, that they should have from the barons all the immunities and privileges granted by the king to the former. Merchants were to be allowed to carry on their business without any arbitrary tolls or impositions, and to go out of the kingdom and return at pleasure. The goods of every freeman were to be disposed of according to his will; or if he died intestate, the nearest heir should succeed him. No carts, horses or wood, were to be taken by the crown officers without the consent of the owner. The king’s courts were to be stationary, and no delay to be made in doing justice to every one; no freeman should be taken or imprisoned, dispossessed of his free tenement, outlawed or banished, unless by the legal judgment of his peers, &c. It was likewise stipulated, that London should remain in the hands of the barons, and the tower be configned to the prince, till the 15th of August following; or till the articles of the charter should be fulfilled. To give the more security for this, the king allowed them to choose 25 of their own number, to whose authority no limits were set either in extent or duration. If any complaint were made of a violation of the charter, either by the king or his officers, any four of the barons might admonish the king to redress the grievance; and if satisfaction were not obtained
England, obtained, they might assemble the whole council of 25; and they, in conjunction with the great council, were employed to compel the charter. In case of his reluctance they had liberty to levy war against him, attack his castles, and use every kind of violence, except against his person, or those of the queen or children. All men throughout the kingdom were bound under the penalty of confiscation, to swear obedience to the 25 barons; and the freetholders of each county were to choose 12 knights, whose business it was to report such evil customs as ought to be redressed in terms of Magna Charta.

But although John had thus obliged himself, by writing, to allow liberty to his subjects, he had no mind that they should enjoy it in reality. The sense of his subjection to his own vassals funk deep in his mind. He became sullen, ilect, and referred. He hummed the society of his former friends; and retired into the Isle of Wight, as if to hide his disgrace in solitude; but, in reality, to meditate revenge against the barons. He sent to the continent to enlist a large body of mercenary troops, and made complaints to the pope, of the infractions of the barons against him. The pontiff very warmly espoused his cause; and at the same time the foreign troops arriving, the king once more found himself in a condition to demand his own terms from his subjects. The barons had made no preparations for war, not suspecting the introduction of a foreign army. The king, therefore, was for some time undaunted master of the field, and the most horrid cruelties were committed by his army. The nobility who had been most active in procuring the great charter fled with their families to Scotland, where they obtained the protection of King Alexander by doing homage to him. The barons being totally unable to raise an army capable of contending with that of John, applied to their old enemy Philip of France, offering to acknowledge his eldest son Louis for their sovereign, on condition of his protecting them from the fury of John and his mercenaries. The French king accepted their proposal with joy; and twenty-five hostages which he demanded being sent over, began to make the most diligent preparations for this expedition, regardless of the menaces of the pope, who threatened him with excommunication, and actually excommunicated his son Louis some time after.

The first troops who came to the assistance of the barons, were only a body of 7000 men; but, soon after, Louis with a powerful army landed at Sandwich. The first effect of this invasion was, that most of John's foreign troops deserted, refusing to serve against the heir of their monarchy. Many considerable noblemen also defected his cause, and Louis daily gained ground. This prince advanced to London, where the barons and burgheers did him homage, and took the oath of allegiance, after he had sworn to confirm the liberties and privileges of the people. His imprudence, however, in preferring on all occasions his French subjects to the English, soon excited a jealousy against him, which proved very prejudicial to his cause. This jealousy was greatly increased by the death-bed confession of the count de Melun, one of his courtiers, who declared to these about him, that it was Louis's design to exterminate the English barons as traitors, and to bestow their dignities and estates upon his French subjects, on whose fidelity he could more safely rely. This caused a considerable defection among Louis's party: so that John once more found himself in a condition to make an effort for his crown. He resolved to penetrate into the heart of the kingdom; and, for this purpose, he departed from Lynn, and took the road towards Lincolnshire at the head of a great body of troops. His road lay along the shore, which was overflowed at high water; but the king, not being apprised of this, or being ignorant of the tides of the place, lost all his carriages, treasure, and baggage by their influx. He himself escaped with the utmost difficulty, and arrived at the abbey of Wincleston; where his grief for the loss he had sustained, and the distracted state of his affairs, threw him into a fever, which soon appeared to be attended with fatal symptoms. He died at Newark in the year 1216, the Death of 8th of his age, and 18th of his reign. He left two legitimate sons: Henry, who succeeded him on the throne, and was about nine years of age; and Richard, who was about seven. He left also three daughters; Jane, married to Alexander king of Scotland; Eleanor, married to the Earl of Pembroke; and Isabella, married to the Emperor Frederic II.

When John died, the Earl of Pembroke was marshall of England. By this office he was at the head of the army, and of consequence, in times of such turbulence, at the head of the state. He was a nobleman of great honour and fidelity, and had continued faithful to John in his greatest reverses of fortune. He now determined to support the authority of the infant prince Henry; and therefore carried him immediately to Gloucester, where the ceremony of coronation was performed, in presence of Guilio the legate and a very few noblemen, by the bishops of Winchester and Bath. The young prince was obliged to swear fealty to the pope, and renew the homage which his father had done for the kingdom; after which the Earl of Pembroke was chosen protector.

Till the king arrived at the years of maturity, the transfections of his reign can only be considered as the consequences of the disposition of his tutors. Pembroke caused him grant a new charter of liberties, new charters confuting the concessions extorted from John, with some alterations; and the next year it was renewed, with the addition of some other articles. Thus these famous charters were brought very nearly to the shape in which they have ever since fixed; and they were, during many generations, esteemed the most sacred rampart to national liberty and independence. As they secured the rights of all orders of men, they were anxiously defended by all, and became in a manner the basis of the English monarchy, and a kind of original contract, which both limited the authority of the king, and ensured the conditional allegiance of his subjects. Though often violated, they were still claimed and recalled by the nobility and people; and as no precedents were supposed valid that infringed them, they rather acquired, than lost, authority, from the frequent attempts made against them, in several ages, by regal and arbitrary power.

These charters were made use of by Pembroke as arguments to draw off the malecontent barons from their allegiance to Louis: He represented to them, that whatever...
Disabilities from defending themselves. This misfortune
so discouraged the barons who yet adhered to Louis,
that they came from every quarter to make their sub-
mision to Pembroke; and Louis himself, finding his
affairs totally desperate, was glad to make his escape
from a country where every thing was become hostile
to him. He therefore concluded a peace with the Pro-
tector; promised to evacuate the kingdom; and only
fliptulated in return, an indemnity to his adherents, and
a renunciation of their honours and fortunes, together
with the free and equal enjoyment of those liberties
which had been granted to the rest of the nation.

When the king grew up, he was found to be very
unfit for the government of such a turbulent people as
the English at that time were. Though his temper
was mild and humane, he was also very weak, sickly,
and irresolute. He indulged the people by the care-
lessnes he bestowed on foreigners; and this diffcil11e role
once to such a height, that the barons refused to as-
semble in the general council of the nation, or parlia-
ment, at his desire. When commanded to do so, they
fearfully refused to attend him in order to do him the
most servile offices; otherwif-e they would drive both
him and them out of the kingdom, and put the crown on
the head of one who was more worthy to wear it. The
facility of Henry's temper also induced him to heap
riches on his foreign favourites in a manner which
he could by no means afford; this often brought him
into very great straits; and to relieve himself, he
was obliged to have recourse to many arbitrary mea-
ures, which he could not otherwise have chosen. No-
thing, however, of very great moment happened till
the year 1255, when the Pope found means to embar
Henry in a scheme for the conquest of Naples, or Si-
cily on this side the Farc, as it was called: an enter-
prise which not only brought much dishonour on the for-
ing, but involved him for some years in very great
ex pense and trouble. The court of Rome some time
before had reduced the kingdom of Sicily to the fame
state of feudal vaflalage which the pretended to exer-
cise over England; but Mainfroy, an uffaper, under
pretence of governing the kingdom for the lawful heir,
had feized the crown, and was resolved to rej ect the
Pope's authority. As the Pope found that his own
force alone was not sufficient to gain his point, he had
recurrte to Richard the king of England's brother,
who had been created Earl of Cornwall, and had fuch
talents for amassing money, that he was reckoned the
richest prince in Christendom. To him the Pope of-
fered the kingdom of Sicily, upon the single condition
of his conquering it from the usurer. Richard was too
wif-e to accept this offer; upon which the Pope applied
to Henry, and offered him the crown of Sicily for his
second fon Edmund. Henry, dazzled by this propos-
fal, without reflecting on the consequences, or with-
out confulting his brother or the parliament, gave the
Pope unlimited credit to expend whatever sums he
thought necessary for completing the conquest of Si-
cily. In conquence of this unlimited grant, his holiness
was determined to exert his apostolical authority to the
ut-most, in extorting money from the English. A cru-
fade was publithed, requiring every one who had taken
the crofs against the infidels, or even vowed to advance
money for that purpose, to support the war against
Mainfroy, whom he accused as being a more terrible
enemy.
England, enemy to the Christian faith than any Saracen. A tenth on all the ecclesiastical benefits in England was levied for three years; and orders were given to communicate the bishops who did not make partial payment. A grant was made to the king of the goods of interate clergymen, as well as of the revenues of vacant benefices and those of non-residents. These taxes, however grievous, were submitted to with little murmuring; but another suggested by the bishop of Hereford excited the most violent clamours. This prelate, who at that time resided at the court of Rome, drew bills on all the abbeys and bishops of the kingdom, to the amount of no less than 150,140 marks, which he granted to Italian merchants in consideration of the money they had advanced or pretended to advance for the support of the Sicilian war. As it was apprehended that the English clergy would not easily submit to such an extraordinary demand, a commissary was given to Ruffland, the Pope's legate, to use his authority. An assembly of the prelates and abbots was accordingly summoned; who, on hearing the proposal sanctified with the names both of the Pope and king, were struck with this unaccustomed affront and indignation. A violent altercation took place; during which the legate told them, that all ecclesiastical benefices were the property of the Pope, and that he might dispose of them as he pleased. The affair ended, however, in the submission of the clergy; but the barons still continued refractory, and for some time answered the king's demands of supplies with expostulations; urging the king's partiality to foreigners, and the various injuries the nation had sustained from the servants of the crown. The great council of the nation, which had lately obtained the name of parliament, was therefore dissolved, and another called, but with as little success as before. The king, however, had involved himself in so much debt, that a large supply was become absolutely necessary; and as that could by no means be obtained from parliament, he was now reduced to the humiliating expedient of going about among such of his subjects as he thought most attached to him, and begging assistance from them at their own houses. At length his barons, perceiving the exigencies to which he was reduced, seemed willing to afford him aid; and, upon his promising to grant them a plenary redress of grievances, a very liberal supply was obtained, for which he renewed their charter with more than usual solemnity. All the prelates and abbots were assembled with burning taperers in their hands; the magna charta was read in their presence; and they denounced sentence of excommunication upon all who should infringe upon its decisions. They then put out their taperers on the ground, and exclaimed, "May every soul that proves false to this agreement be shewn and corrupt in hell." The king subjoined, "So help me God, I will inviably keep all these things, as I am a man, as I am a Christian, as I am a knight, and as I am a king crowned and anointed."

No sooner had the king received the supplies of which he stood so much in need, than he forgot all his engagements, put his confidence entirely in foreign counsellors, and evaded or broke through in numbers his charters he had given. This conduct rendered him obnoxious to the barons, that Simon Mountfort Earl of Leicester, a man of a very violent and ambitious temper, determined to attempt an innovation in the government. He formed a powerful confederacy against the king, and the designs of the conspirators were effectually put in execution in the year 1298. Henry had summoned a parliament in expectation of receiving supplies for his Sicilian project; when the barons appeared in the hall, clad in complete armour, with their swords by their sides. The king, struck with this unusual appearance, asked them what was their purpose, and whether they pretended to make him their prisoner? Roger Bigod, Earl Marrefchal, answered in name of the rest, that he was not their prisoner; that they even intended to grant him large supplies, in order to fix his son on the throne of Sicily; that they only expected some return for this expense and service; and that as the king had frequently made submissions to the parliament, had acknowledged his past errors, and had still allowed himself to be carried into the same path, which gave them such reason of complaint, he must now yield to more strict regulations, and consider authority on those who were able and willing to redress the public grievances. The king answered the barons all they all, that he granted to Italian merchants in consideration of the money they had received the sovereign power, took care not to part with it again.

Thee constitutions were so just, that some of them had continued to this day. But the parliament having once acted, the obtained the sovereign power, took care not to part with it again. They not only procrastinated the time of their sitting under various pretences; but at last had the effrontery to impose an oath upon every individual of the nation, declaring an implicit obedience to all the statutes executed or to be yet executed by the barons who were thus appointed as rulers. They not only abridged the authority of the king, but the efficacy of parliament also; giving up to 12 persons the whole parliamentary power between each fection. Their usurpations were first opposed by the knights of the shire, whom they themselves had appointed. These had for some time begun to be regularly assembled in a separate house, to consider of the national grievances; the first of which was the conduct of the 24 rulers. They represented, that though the king had performed all that was required of him, the barons had hitherto done nothing on their part that showed an equal regard for the people; that their own interest and power seemed the only aim of all their decrees; and they even called upon the king's elated son prince Edward.

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Edward to interpose his authority, and save the linking nation.

The prince was at that time about 22 years of age, and by his active and resolute conduct had inspired the nation with great hopes. He told those who made the application to him, that he had sworn to the late constitutions; and, on that account, though they were contrary to his own private opinions, he was resolved not to infringe them. At the same time, however, he feared offending the barons, by requiring them to stop their undertaking to an end, or otherwise to expect the most vigorous resistance to their usurpations. On this the barons were obliged to publish a new code of laws, which, though it contained scarce any thing the barons who had hitherto from their undertaking to an end, this the barons were obliged to submit for a time; but the Earl of Leicester having joined the Welch, who at this time made an irruption into England, the kingdom was reduced to the most deplorable situation. The pugnaciously of the king prevented any proper or judicious method from being purposed for extricating the people from their diftreffes; and at last a treaty was concluded with the barons on the most dil advantageous terms that can be imagined. They were restored to the sovereignty of the kingdom, took possession of all the royal castles and fortresses, and even named the officers of the king's household. They summoned a parliament to meet at Oxford, in order more fully to settle the plan of government; and by this assembly it was enacted, that the authority of the 24 barons should continue not only during the life of king Henry, but also during that of prince Edward.

These scandalous conditions would have been easily complied with by king Henry; but they were utterly rejected by prince Edward, and a civil war immediately ensued. The prince was at first successful; but, through his impetuosity, occasioned the loss of a great battle, in which his father and uncle were taken prisoners, and he himself was obliged soon after to surrender to the Earl of Leicester. The king was now reduced to the most deplorable situation. His partizans were totally disarmed, while those of the Earl of Leicester still kept themselves in an offensive posture. Leicester feized the estates of no fewer than 28 barons, engrossed to himself the raimond of all the prisoners, monopolized the sale of wool to foreign markets; and at last ordained that all power should be exercised by nine persons, who were to be chosen by three others, or the majority of them; and these three were the Earl of Leicester himself, the Earl of Glocester, and the bishop of Chichester.

The miserable situation to which the kingdom was now reduced, proved at last the means of settling the government on a more proper foundation. Leicester, in order to secure his self, was obliged to have recourse to an aid, till now, entirely unknown in England, namely, that of the body of the people. He called a parliament, where, besides the barons of his own party, and several ecclesiastics who were not proper tenants of the crown, he ordered returns to be made of two knights from every shire; and also deputies from the boroughs, which had been hitherto considered as too inconsiderable to be allowed any share in the legislation. This parliament was called on the 20th of January 1265: and here we find the first outline of an English House of Commons, an institution which has ever since been considered as the bulwark of British liberty.

The new parliament was far from being so compliant to Leicester as he had desired or expected. Many of the barons who had hitherto steadfastly adhered to his party, were disgusted with his boundless ambition; and the people, who found that a change of masters was not a change from misery to happiness, began to wish for the re-establishment of royal authority. Leicester at last, to make a merit of what he could not prevent, released prince Edward from his confinement, and had him introduced at Westminster-hall, where his freedom was confirmed by the unanimous voice of the barons. But though Leicester had all the popularity of the preceding prince, he was yet left at liberty to keep him guarded by his eminaries, who watched all his actions. At last, however, he found means to make his escape in the following manner. The Duke of Glocester, being disgruntled with Leicester, retired from court, and went to his estates on the borders of Wales. His antagonist pursued him thither; and to give the greater authority to his arms, carried the king and prince of Wales along with him. This furnished young Edward with the opportunity he had so long desired. Being furnished by the Earl of Glocester with an horde of extraordinary swifnesses, he took leave of his attendants, who were in fact his guards, but were not able to come up with him. They pursued him, however, for some time, but the appearance of a body of troops belonging to Glocester soon put an end to their pursuit.

The prince no sooner recovered his liberty, than the Prince Edward royalists joined him from all quarters, and an army was warned to be on the watch for the Earl of Leicester. The Earl of Winchester, lordcustos of the crown, who was in the service of the rightful king, hearing of the attempt to be made against this nobleman now found himself in a remote quarter of the kingdom; surrounded by his enemies; and debarred from all communication with his friends by the river Severn, whose bridges Edward had broken down. In this extremity, he wrote to his son to hasten to his assistance from London, with a considerable army which he had under his command. With this view his son advanced to Kenilworth; but here he was surprised, and his army entirely dispersed by prince Edward. The young prince, immediately after this victory, advanced against Leicester himself; who, ignorant of the fate of his son's army, had passed the Severn in boats. He was by no means able to cope with the royalists; his men being inferior both in numbers and resolution to their antagonists. His army was defeated with great slaughter. Leicester himself was slain, Earl of Salisbury was killed, and about 160 knights and other gentlemen. The old king had been purposely placed in the front of the battle, where he was wounded, and in great danger of being killed; but, crying out, "I am Henry of Wincheister your king," he was sav'd and put in a place of security by his son, who
England: who had flown to his affilliance. The body of Leicestershire being found among the dead, was barbarously mangled by one Roger Mortimer; and then sent to his widow, as a testimonial of the royal party's barbarity and success.

This victory, gained at Evesham, proved decisive in favour of the royal party. Almost all the castles, garrisoned by the barons, hastened to make their submissions, and opened their gates to the king. The Isle of Axholme alone, and that of Ely, trusting to the strength of their situation, ventured to make resistance; but were at last reduced, as well as the castle of Dover, by the valor and activity of prince Edward. Adam de Gourdon, a courageous baron, maintained himself some time in the forests of Hampshire, committing depredations in the neighbourhood; and obliged the prince to lead a body of troops into that country against him. Edward attacked the camp of the rebels; and being transported by the ardour of action, leaped over the trench with a few followers, and encountered Gourdon himself in a single combat. The latter was long disputed between these two valiant combatants; but ended at last in the prince's favour, who wounded his antagonist, threw him from his horse, and took him prisoner. He not only granted him his life; but introduced him that very night to the queen at Guildford, procured his pardon, and was ever after faithfully served by him.

In 1271, prince Edward, having settled the affairs of the kingdom, undertook an expedition to the Holy Land, where he signalized himself by many acts of valor. The king's health declined visibly after the departure of his son; and at last worn out with cares and the infirmities of age, he expired at St Edmondsbury on the 16th of November 1272, in the 64th year of his age and the 56th of his reign.

Prince Edward had reached Sicily in his return from the Holy Land, when he received an account of his father's death; at which he expressed much concern. As he knew that England was at that time in a state of perfect tranquillity, he was in no haste to return, but spent near a year in France before he made his appearance in England. He was received by his subjects with the utmost joy, and crowned at Westminster by Robert archbishop of Canterbury on the 19th of August 1274. He immediately applied himself to the correcting of those disorders which the civil commotions, and weak administration of his father, had introduced. A system of strict justice, bordering on severity, was introduced and kept up through the whole of this reign. The Jews were the only part of his subjects whom Edward opprobred. Many arbitrary taxes were levied upon them; 280 of them were hung at once for adulterating the coin; the goods of the rest were confiscated, and all of them banished the kingdom.

In 1276, the king undertook an expedition against Llewellyn prince of Wales, who had refused to do homage for his crown. The conquest of that country was not fully accomplished till the year 1284; after which the principality of Wales was annexed to the crown of England, and thenceforth gave a title to the king's eldest son*. In 1286, the settlement of Wales appeared to complete, that the king went abroad in order to make peace between Alfonso king of Aragon and Philip le Bel king of France, who had a difference about the kingdom of Sicily. He succeeded in his negociations; but, staying abroad three years, he found that many disorders had been introduced in his absence. Many infinences of robbery and violence had broke out in all parts of England; but the corruption of the judges, by which the fountains of justice were poisoned, was of still greater consequence. Edward, in order to remedy this prevailing abuse, summoned a parliament, and brought the judges to a trial; where all of them except two, who were clergy­men, were convicted of this flagrant iniquity, were fined, and deposed from their office. The amount of the fines levied upon them is of itself a sufficient proof of their guilt, being above 100,000 marks; an immense sum in those days, sufficient to defray the expenses of a war between two great nations. The king afterwards made all the new judges swear they would take no bribes; but the depositing and fining the old ones was the more effectual remedy.

In 1291, king Edward began to meditate the conque­st of Scotland, which employed him during the con­flict of his life; but which, though the kingdom was given by him reduced to the greatest distress, he was never able to accomplish*. At the same time, he was engaged in expensive contests with France; and those multiplied wars and preparations for war, by obliging him to have frequent recourse to parliamentary supp­lies, became the remote causes of great and import­ant changes in the government. The parliament was modelled into the form which has continued ever since. As a great part of the property of the kingdom, by the introduction of commerce and improvements in agriculture, was transferred from the barons to the lower class of people, so their content was thought necessary for raising the supplies. For this reason, the king filled writs to the sheriffs, enjoining them to send to parliament, along with two knights of the shire, two deputies from each borough within their county; and these provided with sufficient powers from their constituents to grant such demands as they should think reasonable for the safety of the state. The charges of these deputies were to be borne by the boroughs which sent them; and so far were they from considering this depopulation as an honour, that nothing could be more displeasing to any borough than to be thus obliged to send a deputy, or to any individual than to be thus chosen. The authority of these commissioners, however, increased through time. Their union gave them weight; and it became customary among them in return for the supplies which they granted, to prefer petitions to the crown for the redress of these grievances under which the nation was supposed to labour. The more the king's necessities increased, the more he found it necessary to give them an early redress; till, from requelling, the commons proceeded to requiring; and having all the property of the nation, they by degrees began also to be possessed of the power.

Edward I. died of a dysentery at Carlisle on the 7th of July 1307, as he was leading a great army into Scotland, against the inhabitants of which he had vowed the most dreadful vengeance. He was succeeded by his son Edward II. whom he had charged with his dying breath to prosecute the war against Scotland, and never to desist till he had finally subdued the
Rent disposition from his father. The Scots gradually recovered their power; and in 1314 gave the English such a terrible defeat at Bannockburn, that for many years no superiority of numbers could encourage them to look the Scots in the face. See Scotland.

Disscontents of his subjects.

The reign of Edward II. affords no particulars of great moment. Being a prince of a weak understanding, though endowed with no remarkable bad qualities, his reign was one continued series of quarrels with his turbulent subjects. His favourites were the most general causes of dissention. The first of these was one Piers Gaveston, the son of a Gascon knight of some distiniction, who had honourably served the late king, and who, in reward for his services, had obtained an establishment for his son in the family of the prince of Wales. To be the favourite of any king whatever, is no doubt in itself a sufficient offence to the rest of the courtiers. Numberless faults were therefore found with Gaveston by the English barons. When the king went over to France to espouse the princess Isabella, to whom he had been long contracted, Gaveston was left guardian of the realm, with more ample powers than had usually been conferred in such a case. But when the queen, who was of an imperious and intriguing spirit, arrived, Gaveston had the misfortune to fall under her displeasure also, on account of the ascendency he had acquired over the king. A conspiracy was therefore soon formed against the favourite; at the head of which were, the queen, and the Earl of Lancaster cousin-german to the king, and the most opulent and powerful nobleman in England. The king, unable to reft his combination, was at last obliged to banish Gaveston; but recalled him some time after. This was sufficient to spread an alarm over the whole kingdom: a civil war ensued; and the nobility having got Gaveston into their hands, soon freed themselves of any farther apprehensions from him, by putting him to death.

After the unfortunate defeat at Bannockburn, king Edward chose a new favourite named Hugh Le Despenser. He was a young man of noble English family; some merit, and very engaging accomplishments. His father was a person of a much more respectable character than the son; but the being admitted to a share of king Edward's favour was a sufficient crime. The king imprudently dishonoured some lords of their estates, in order to befoulThem upon this favourite; and this was a sufficient pretence for openly attacking both the father and son. The earls of Lancaster and Hereford flew to arms. Sentence was procured from parliament of perpetual exile against the two Despensers, with a forfeiture of all their estates. At last the king took the field at the head of 30,000 men, and pressed the Earl of Lancaster so closely, that he had not time to collect his forces together; and, flying from one place to another, he was at last stopped in his way towards Scotland, and made prisoner. He was immediately condemned by a court-martial; and executed on an eminence near Pumfret, with circumstances of the greatest indignity.

Spencer now triumphed for some time over his enemies; most of the forfeitures were seized for his use, and he is said to have been guilty of many acts of alike and injustice. But he was soon opposed by a more formidable enemy. Queen Isabella fled to France, and refused to return to England till Spencer was removed from the royal presence, and banished the kingdom. Thus she made herself popular in England, where the Spencer was universally disliked; and she had the pleasure of enjoying the company of a young nobleman named Mortimer, upon whom she had lately placed her affections. The queen's court, therefore, became a sanctuary for all the malefactors who were banished their own country, or who chose to come over. When the thought matters were ripe for her purpose, she fell from Dort harbour, accompanied by 3000 armed men. She landed without opposition on the coast of Suffolk, on the 24th of September 1326; and she no sooner appeared, than there seemed to be a general revolt in her favour. The unfortunate king found the spirit of disloyalty spread over the whole kingdom. He had placed some dependence on the garrison of Bristol, which was under the command of the elder Spencer; but they mutinied against their governor; and that unfortunate favourite was delivered up, and condemned by the tumultuous barons to the most ignominious death. He was hanged on a gibbet in his arms; his body was cut in pieces and thrown to the dogs; and his head was sent to Winchester, where it was set on a pole, and exposed to the insults of the populace. Young Spencer did not long survive his father. He was taken, with some others who had followed the fortunes of the wretched king, in an obscure convent in Wales. The queen had no patience to wait the formality of a trial; but ordered him to be immediately led forth before the insulting populace, and seemed to take a favage pleasure in beholding his distress. He was executed on a gibbet 50 feet high; his head was sent to London, where it was received by the citizens with brutal triumph, and fixed on the bridge.

In the mean time the king, who hoped to find refuge in Wales, was quickly discovered, and delivered up to his adheraries, who insulted him in the grossest manner. He was conducted to the capital amidst the insults and reproaches of the people, and confined in the tower. A charge was soon exhibited against him; in which no other crimes but his incapacity to govern, his indolence, his love of pleasure, and his being fwayed by evil counsellors, were objected against him. His deposition, however, was quickly voted by parliament; he was assigned a pension for his support; his deposed son Edward, a youth of 14, was chosen to succeed him, and the queen was appointed regent during the minority. The deposed monarch did not long survive the loss of his crown. He was at first confined to the custody of the Earl of Lancaster; but this nobleman, seeing some marks of respect and pity, he was taken out of his hands, and delivered over to the lords Berkeley, Mauvtrares, and Gournay, who were entrust alternately each for a month, with the charge of guarding him. While he was in Berkeley's custody, he was still used with some degree of humanity; but when the turn of Mauvtrares and Gournay came, every species of indignity was practiced upon him, as if they had designed to accelerate his death by the bitterness of his sufferings. It is reported, that one day when Ed-
England. Edward was to be shaved, they ordered cold and dirty water to be brought from a ditch for that purpose; and when he defired it to be changed, and was till denied his request, he burst into tears and exclaimed, That in spite of their insolence he would be shaved with clean and warm water. As his persecutors, however, saw that his death might not arrive, even under every cruelty they could practise, and were daily afraid of a revolution in his favour, they determined to rid themselves of their fears by destroying him at once. Mortimer, therefore, secretly gave orders to the two keepers, who were at his devotion, instantly to dispatch the king; and these ruffians contrived to make the manner of his death as cruel and barbarous as possible. Taking advantage of Berkeley's sickness, in whose custody he then was, and who was thereby incapacitated from attending his charge, they came to Berkeley-castle, and put themselves in possession of the king's person. They threw him on a bed, and held him down with a table which they had placed over him. They then ran a horn pipe up his body, through which they conveyed a red-hot iron; and thus burnt his bowels without disfiguring his body. By this infernal contrivance they expected to have their crime concealed: but the horrid shrieks of the king, which were heard at a distance from the castle, gave a full discovery of the murder; and the whole was soon after divulged by the confession of one of the accomplices. Gournay and Mautravers were held in detestation by all mankind; and when the ensuing revolution deprived them of their protector of power, they found it necessary to fly the kingdom. Gournay was afterwards feized at Marselles, delivered over to the queen, and put on board a ship with a view of carrying him over to England; but he was beheaded at sea, by secret orders, as was supposed, of some nobles and prelates in England, anxious to prevent any discovery which he might make of his accomplices. Mautravers concealed himself for some years in Germany; but having found means of rendering some services to Edward III., he ventured to approach his person, threw himself on his knees before him, and received a pardon.

By the death of Edward II., the government fell entirely into the hands of the queen and her paramour Mortimer. The parliament, which raised young Edward to the throne, had indeed appointed 12 persons as his privy-council, to direct the operations of government. Mortimer excluded himself, under a show of moderation; but at the same time secretly influenced all the measurers that came under their deliberation. As this influence began very soon to be perceived, and the queen's criminal attachment to Mortimer was universally known, these governors soon became very obnoxious to the people. The first stroke given to Mortimer's power was during an irruption of the Scots, when the favourite prevented the young king from attacking the enemy. Though it is very probable that the English army would have been destroyed by making an attack on an army situated in such an advantageous post as the Scots at that time occupied, Mortimer incurred great blame on that account. He was accused of having allowed the Scots to make their escape; and the general disgust on this account was increased by his concluding a peace with that kingdom, wherein the English renounced all title to the sovereignty of Scotland for the sum of 50,000 merks. Soon after Mortimer feized and executed the earl of Kent, brother to the late king; who, supposing Edward II. to be still alive, had formed a design of reinstating him in his kingdom. The execution was so sudden, that the young king had not time even to interpose in his behalf; and Mortimer soon after feized this nobleman's estate for his own use, as he did also the immense fortunes of the Spencers.

Edward, finding the power of Mortimer a continual restraint upon himself, resolved to shake off an authority that was likewise grown odious to the whole nation. The queen and Mortimer had for some time chafen the castle of Nottingham for their residence. It was strictly guarded, the gates were locked every night, and the keys carried to the queen. It was therefore agreed between the king and some of the barons, who secretly entered into his designs, to feize upon them in the forrests. Sir William and the governor was induced to admit them through a subterficial passage, which had been formerly contrived for an outlet, but was now choked up with rubbish, and known only to one or two. Through this passage the noblemen in the king's interest entered the castle in the night-time; and Mortimer, without having it in his power to make any resistance, was feized in an apartment adjoining to that of the queen. The parliament, which was then sitting, condemned him without either permitting him to make his defence, or examining a single witness against him. He was hanged on a gibbet at a place Mortimer called Elme, about a mile from London. A similar execution was passed against some of his adherents, particularly Gournay and Mautravers, who found an opportunity of escaping as abovementioned. The queen, who perhaps was the most culpable of the whole, was screened by the dignity of her station. She was, however, deposed from all share of power; and confined for life to the castle of Rising, with a pension of 3000 pounds a-year. From this confinement she was never set free, though the king paid her an annual visit of ceremony. She lived 25 years after her deposition.

Edward III. proved the greatest warrior that ever sat on the English throne. He first attempted to raise Edward Balio to the sovereignty of Scotland; but this he found impossible fully to accomplish. Edward Edwardsnext formed a project of invading and conquering France, to the sovereignty of which he pretended a right. His first expectations were attended with so little success, that on his return to England he found the nation very much discontented, and himself harassed by his numerous creditors without any sufficient resource for paying them. Being determined, however, not to bear any blame himself if he could throw it anywhere else, he took the first opportunity of wreaking his vengeance upon his subjects. Finding his arbi

Therefore the tower of London negligently guarded on his arrival, he imprisoned the confible and all his inferior officers, treating them with the greatest severity. He then fell upon the sheriffs and collectors of the revenue, whom he disdained from their employments, and appointed an inquiry into their conduct to be made by persons who, knowing the king's humour, were sure to find every one guilty who came before them. The keeper of the privy-seal, the chief justice, the mayor of London,
England.

275 It was opposed by the archbishop of Canterbury.

276 And obliged at last to submit.

the bishops of Chichester and Litchfield, with the chancellor and treasurer, were deposed and imprisoned. In this career of resentment and cruelty, however, he found himself opposed by the archbishop of Canterbury, whom he had appointed to collect the taxes laid on for the support of the French war. That prelate, happening to be absent at the time of the king's arrival, did not immediately feel the effects of his resentment. Being informed, however, that his lordship, in a letter to the king, informed him that there were two powers by which the world was governed, viz. the holy pontifical apostolical dignity and the regal authority; of which the clerical power was evidently the supreme, as the priests were to answer even for the conduct of kings at the last judgment; and were besides the spiritual fathers of all the faithful, kings and princes not excepted; having, besides, a heavenly charter, intitling them to liberty and the regal authority, and the conduct of such barons as should at the time be found to reside in the neighborhood of the court. They enacted also, that on the third day of every feccion the king should resume all such offices into his own hand, excepting those of the justices of the two benches and the barons of escheuer; that the ministers should for the time be reduced to private persons; that they should in that condition answer before parliament to any accusation preferred against them; and that, if they were found in any respect guilty, they should be finally deprived of their offices, and others appointed in their stead. In return for such ample concessions, the king was offered a grant of 20,000 marks, and such was his urgent necessity, that he was compelled to accept of it even upon these terms. Still, however, he determined to adhere to his engagements no longer than till this necessity was removed. Though the agreement therefore was ratified in full parliament, he secretly entered a protest, that, as soon as his convenience permitted, he would from his own authority revoke what had been extorted from him. This protest was afterwards confirmed by a public edict, in which he asserted, that that statute had been made contrary to law; that it was prejudicial to the prerogatives of the crown, which he had only delegated when he seemed to ratify it; and that in his own breast he had never submitted to it: and declared, that from henceforth it had no force or authority. This exaction of arbitrary power, which it might have been imagined his power would have occasioned a prodigious clamour, was not taken notice of by any of the subsequent parliaments; so that in the course of two years Edward had entirely regained his authority, and obtained a repeal of the obnoxious statute just mentioned. Having thus settled matters to his satisfaction, the king resumed his expedition against France, where he gained great advantages. In his absence the Scots invaded England; but were entirely defeated at Barnham, and their king himself taken prisoner. The English thus in the mean time continued his victories on the continent; in which he was greatly assisted by Edward furnamed the Black Prince, the greatest hero recorded in the English annals. But for the wars of Edward III. and the exploits of this famous prince, see the articles Scotland and France. The Black Prince died on the 8th of June 1376, and the king survived only about a year. He expired on the 21st of June 1377, and was succeeded by his second son Richard II.

As the new king was only eleven years old when he ascended the throne, the government was vested in the hands of his three uncles the dukes of Lancaster, York, and Gloucester. The different dispositions of these noblemen, it was thought, would cause them to check the designs of each other. Lancaster was neither popular nor enterprising; York was indolent and weak; and Gloucester turbulent, popular, and ambitious. Discontents first arose among the common people. They had now acquired a share of liberty sufficient to insipre them with a desire for more, and this desire was greatly increased by the discourses of one John Ball a turbulent preacher. He went about the country, and incalculating on his auditors, that mankind were all derived from one common stock; and that all of them had equal right to liberty and the goods of nature, of which they had been deprived by the ambition of a few insolent rulers. These doctrines were greedily swallowed by the populace, who were farther inflamed by a new imposition of three groats a-head upon every peron in the kingdom above 15 years of age. This had been granted as a supply by parliament, and was no doubt necessary on account of the many expensive wars in which the kingdom was engaged: but its apparent injustice, in laying no more burden upon the rich than the poor, excited the utmost resentment of the people. The manner, too, of collecting this tax, soon furnished them with an occasion of revolt. It began in Eves, where a report was industriously propagated among the inhabitants that their houses should to be destroyed, their buohes burned, and their farms plundered. A blacksmith, well known by the name of
of Wat Tyler was the first that excited them to arms. The tax-gatherers coming to this man's house while he was at work, demanded payment for his daughter. This he refused, alleging that she was under the age mentioned in the act. One of these fellows offered to produce a very indecent proof to the contrary; and at the same time laid hold of the maid. This the father, resenting, immediately knocked out the ruffian's brains with his hammer. The bystanders applauded the action; and exclaimed that it was high for the people to take vengeance on their tyrants, and to vindicate their native liberty. The whole country immediately took arms, and the insurgents soon amounted to about 100,000 men. They advanced to Blackheath where they sent a message to the king, who had taken shelter in the tower, defiring a conference with him. The king was delirious of complying with their demands, but was intimidated by their fierce behaviour. In the mean time they entered the city, burning and plundering the houses, of such as were obnoxious for their power or riches. Their animosity was particularly levelled against the lawyers, to whom they showed no mercy. The king at last, knowing that the tower was not able to resist their assaults, went out among them, and desired to know their demands. To this they made a very humble remonstrance; requiring a general pardon, the abolition of slavery, freedom of commerce in the market-towns, and a fixed rent instead of those services required by the tenure of vil- lenage. The king granted all these requests; and charters were made out by which the grant was ratified. In the mean time, however, another body of these insurgents had broken into the tower, and murdered the chancellor, the primate, and the treasurer, with some other officers of distinction. They then divided themselves into bodies, and took up their quarters in different parts of the city. At the head of one of these was Wat Tyler, who led his men into Smithfield, where he was met by the king, who invited him to a conference under pretence of hearing and redressing his grievances. Tyler ordered his companions to retire till he should give them a signal, and boldly ventured to begin a conference with the king in the midst of his retinue. His demands were. That all fines should be set free; that all communings should be open to the poor as well as to the rich; and that a general pardon should be passed for the late outrages. While he made these demands, he now and then lifted up his sword in a menacing manner: which insolence so rai- sed the indignation of William Walworth, lord mayor of London, that, without considering the danger to which he exposed his majesty, he flung Tyler with a blow of his mace; while one of the king’s knights riding up, discharged him with his sword. The mutineers, seeing their leader fall, prepared themselves to take revenge. Their bows were already bent for execution; when Richard, though not yet 16 years of age, rode up to the rebels, and with admirable presence of mind cried out: “What, my people, will you kill your king? Be not concerned for the loss of your leader. I myself will now be your general. Follow me into the field, and you shall have whatever you desire.” The multitude immediately deserted, and followed the king into the fields, where he granted them the same charters that he had before granted to their compa- nions. These charters, however, were soon after re- voked, and the common people reduced to the same situation in which they had formerly been.

The courage, address, and presence of mind, which the king had discovered in quelling such a dangerous tumult, gave great hopes to the nation; but, in proportion as Richard advanced in years, these hopes were blighted; and his want of capacity, or at least of solid judgment, appeared in every enterprise he attempted. The king had unfortunately lost the favour of the common people after the insurrection just mentioned. He allowed the parliament to revoke the charters of enfranchisement and pardon which had been granted; some of the ringleaders in the late disorders had been severely punished, and some even put to death without any form of process or trial. Thus the popular leaders were greatly exasperated by this cruelty, though probably the king did not follow the dictates of his own mind so much in it as the advice of his councilors. But having thus lost the favour of one party, he quickly fell under the displeasure of the other also. Supposing himself to be in too great subjection to his uncles, particularly the Duke of Gloucester, he attempted to shake off the yoke, by raising others to such a degree of power as might enable them to rival them. His first favourite was Robert de Vere Earl of Oxford, a young man of an agreeable person, but dilolute in his behaviour, who soon for the Earl of Oxford acquired an absolute ascendancy over him. So much was he determined to show his attachment to this nobleman, that he first created him Marquis of Dublin, a title never known in England before; then Duke of Ireland; transferring to him the entire sovereignty of that island by patent for life. He gave him in marriage his cousin-german, the daughter of the Earl of Bedford; but soon after permitted him to divorce her for another lady with whom he had fallen in love. This nobleman soon became the dispenser of a compi- racy against the king.

He is killed.

The courageous address of the young king had excited the admiration of the people. His noble speech to the rebel soldiers had obtained him the love of the commons. The crown seemed to be about to become his. The pontiffCardinal Wolsey,archbishop of Canterbury,feemed about to confirm the counsels of the boy with his approbation. The Duke of Gloucester, however, was determined to distract the attention of the people from their master, and to obtain a precedent for a dangerous project against the royal authority. Under pretence that the king was yet unable to govern the kingdom, though at that time 21 years of age, they appointed a commissión of 14 persons to whom the sovereignty was to be transferred for a year. This measure was driven forward by the Duke of Gloucester, and none but his own faction were admitted as members of the committee. The king could not without regret perceive himself thus totally deprived of authority. He first endeavoured to gain over the parlia- ment to his interests, by influencing the sheriffs of each county, who were then the only returning officers. This measure failing, he next applied to the judges. They declared, that the commissión which had deprived the king of his authority was unlawful, and that those who procured or advised it were punishable with death. Their sentence was quickly opposed by declara- tions from the lords. The Duke of Gloucester armed his partisans; and appeared at Haringay park near Highgate.
England.
The power into to govern without help; and that there was no reason his own why he
furgents, fensible of their own power, began by demanding of the king the names of thofe who had advised
him to his late rash measures. A few days afterwards they appeared armed in his presence, and
accufed by name the Archbishop of York, the Duke of Ireland, the earl of Suffolk, and Sir Robert Trelifian,
one of the judges who had declared in his favour, together with Sir Nicholas Bamber, as public and dan-
gerous enemies to the state. The duke of Ireland fled into Chefhire, where he attempted to raise a body of
forces; but was quickly obliged to fly into Flanders, on the arrival of the Duke of Glouceifer with a superior
army. Trelifian, who was in the interval, Lord Beauchamp of Holt
had been appointed the king's governor, shared the fame fate, though the queen continued for three hours
on her knees before the Duke of Glouceifer, imploring his pardon.
Such unparalleled insolence and barbarity in a sub-
ject could not go unpunifled. In 1389, the king, at
an extraordinary council of the nobility affembled after
Exeter, to the afhontment of all pretence, defire to
know his age. Having been told that he was turned of two
and twenty, he alleged that it was then time for him to
govern without help; and that there was no reafon why he
should be deprived of thofe rights which the meaneft of his subjects enjoyed. The lords anwered
in fonme confusion, that he had certainly an undifputed
right to take upon himfelf the government of the king-
dom. "Yes (replied the king), I have long been under the government of tutors; and I will no longer
flow my right to power by their removal." He then
ordered Thomas Arundel, whom the confummoners
had lately appointed chancellor, to give up the fells;
which he next day delivered to William Wickham
before his miniLlers followirig his
decision, gave Hereford the lie, and offered
to prove his innocence by fingle combat. The chal-
lenge was accepted; but on the day appointed for the
duel, the king would not suffer the combatants to en-
gage, but commanded both of them to leave the king-
dom. The duke of Norfolk he banifhed for life, but
the Duke of Hereford only for ten years. The former
retired to Venice, where in a fhort time he died of a
fevere and vigorous adminiLll'ation. The Duke of
Hereford behaved in a
submiffive manner; which fo pleased the king, that he
was confufled to shorn the time of his punishment four
years; he also granted him letters patent, entitling
him of the enjoyment of any inheritance which should
fall to him during his abfence; but upon the death of his
father the Duke of Lancaster, which happened
shortly after, Richard revoked thofe letters, and kept the
eliate to himfelf.
This fmall injury infamed the refentment of Here-
ford to fuch a degree, that he formed a design of de-
throning the king. He was a great favourite both of
the army and people; he was immenfely rich, and
connected by blood or alliance with all the great families of the nation. The king at the fame time, it
was difcovered, had often offended in the adminif-
tration of his miniflers following his example the nation
was in a furprifing situation at home, he went over to Ireland
with a coniderable army, in order to revenge his death
in perfon. The Duke of Lancaster (for that was the
title which Hereford affumed on the death of his fa-
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malecontent, together with Henry Percy his fon, who
from his ardent valour was furnamed Hotspur, imme-
diately joined him with their forces; and the people
focked to him in fuch numbers, that in a few days his
army amounted to 60,000 men

Earls of Arundel and Warwick were feized at the fame
time; and a new parliament, in which the king knew
would be perfectly obedient to his will, was summoned
to Westminster. Here the commiffion of 149, who had
ufurped on the royal authority, was annulled for ever;
all thofe acts which had condemned his former minis-
ters were repealed; and the general pardon which the
king had formerly given when he assumed the govern-
ment into his own hands, was revoked. Several of Duke of
Gloceifer's party were condemned and executed, and Gloceifer
at laft that nobleman himfelf was called for to take his
trial as well as the reft; but he had before been pri-
vately difpatched in prifon.
After the defftruction of the Duke of Gloceifer and
the heads of his party, a miufderftanding arose among
the noblemen who had joined in the prosecution. The
Duke of Hereford appeared in parliament, and accused
the Duke of Norfolk of having spoken feditious words
against his majefly in a private conversation. Norfolk
denied the charge, gave Hereford the lie, and offered
to prove his innocence by fingle combat. The chal-
lenge was accepted; but on the day appointed for the
duel, the king would not suffer the combatants to en-
gage, but commanded both of them to leave the king-
dom. The duke of Norfolk he banifhed for life, but
the Duke of Hereford only for ten years. The former
retired to Venice, where in a fhort time he died of a
broken heart. Hereford behaved in a refignfed and
submiffive manner; which fo pleased the king, that he
was confufled to shorn the time of his punishment four
years; he also granted him letters patent, entitling
him of the enjoyment of any inheritance which should
fall to him during his abfence; but upon the death of his
father the Duke of Lancaster, which happened
shortly after, Richard revoked thofe letters, and kept the
eitate to himfelf.
This fmall injury inflamed the refentment of Here-
ford to fuch a degree, that he formed a design of de-
throning the king. He was a great favourite both of
the army and people; he was immenfely rich, and
connected by blood or alliance with all the great families of the nation. The king at the fame time, it
was difcovered, had often offended in the adminif-
tration of his miniLlers following his example the nation
was in a furprifing situation at home, he went over to Ireland
with a coniderable army, in order to revenge his death
in perfon. The Duke of Lancaster (for that was the
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England.
Richard, in the mean time, continued in perfect security in Ireland for some time. Contrary winds for three weeks together prevented his receiving any news of the rebellion which was begun in his native dominions. He landed therefore at Milford Haven without suspicion, attended by a body of 20,000 men; but immediately found himself opposed by a power which he could by no means resist. His army gradually deserted him, till at last he was obliged to acquaint the duke, that he would submit to whatever terms he pleased to prescribe. The duke did not think proper to enter into any treaty with the king; but carried him to London, where he was confined close prisoner in the Tower, formally deposed by parliament, or rather by the Duke of Lancaster, and at last put to death. The manner of his death is variously related. According to some, eight or nine ruffians were sent to the castle of Pomfret, whether the unhappy prince had been removed, in order to dispatch him. They roused unexpectedly into his apartment; but Richard, knowing their design, resolved to sell his life as dear as possible. He seized a pole-ax from one of the murderers, with which he killed four of them; but was at length overpowered and killed. Others relate that he was starved in prison; and that, after he was denied all nourishment, he prolonged his life 14 days, by feeding on the flecks of his bed. He died in the year 1399, in the 34th year of his age, and 23d of his reign.—It was during the reign of Richard II. that Wickliff, the noted reformer, published his doctrines in England. See WICKLIFFE.

After the sentence of deposition had been pronounced on Richard by both houses of parliament, the throne being then vacant, the Duke of Lancaster stepped forth; and having crost himself on the forehead and on the breast, and called on the name of Christ, gave in his claim to the throne in the following words, which we shall give in the original language. "In the name of Fadher, Son, and Holy Ghost, I Henry of Lancaster, challenge this remowe of Ynglonde, and the crowne, with all the members and the appurtenances; as I that am defendit by right line of the blode, coming fro the gude king Henry theerde, and throug that right that God of his grace hath sent me, with help of kyn, and of my frendes to recover it; the which remowe was in poynit to be ondone by default of governement, and ondoying of the gude lawes."

The right which the duke here claimed by descent from Henry III. proceeded on a false story that Edmund Earl of Lancaster, son of Henry III. was really the elder brother of Edward I.; but that, by a fault of some deformity in his person, he had been postponed in the succession, and Edward the younger brother, impoed on the nation in his stead. The present Duke of Lancaster inherited from Edmund, by his mother, the right which he now pretended to the crown; though the falsehood of the story was generally known, that he thought proper to mention it only in general terms.—No opposition, however, was made to the validity of this title in parliament; and thus commenced the differences between the houses of York and Lancaster, which were not terminated but by many bloody and ruinous wars.

The reign of Henry IV. was little else than a continued series of insurrections. In the very first parlia-

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His son deceased and filled at Shrewsbury.

The battle was fought on the 20th of July 1403; and we can scarce find in those ages any other in which the shock was so terrible and confvant. At last Piercy being killed by an unknown hand, the victor was de-

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The clergy polled as a third of the lands of the king; and they contributed nothing to the public burdens; and that their exorbitant riches tended only to disqualify them from performing their ministerial functions with proper zeal and attention. When this address was presented, the Archbishop of Canterbury, who then attended the king, objected that the clergy, though they went not in person to the wars, sent their vassals and tenants in all cases of necessity; while at the same time, they themselves who lived at home were employed night and day in offering up their prayers for the happiness and prosperity of the state. The speaker answered with a smile, that he thought the prayers of the church but a very slender supply. Their archbishops, however, prevailed in the dispute; the king discouraged the application of the commons; and the lords rejected the bill which the lower house had framed for depoising the church of its revenues. The commons were not discouraged by this repulse. In 1416, they returned to the charge with more zeal than before. They made a calculation of all the ecclesiastical revenues, which, by their account, amounted to 48,000 marks a year, and included 18,400 ploughs of land. They proposed to divide this property among 15 new earls, 1500 knights, 6000 esquires, and 100 hospitals; besides 20,000 pounds a year, which the king might keep for his own use; and they inferred that the clerical functions would be better performed than at present, by 15,000 parish-priests, at the rate of 7 marks a-piece of yearly stipend. This application was accompanied with an address for mitigating the statutes enacted against the Wickliffites or Lollards, so that the king knew very well from what source it came. He gave the commons, however, a severe reply; and further to satisfy the church that he was in earnest, ordered a Lollard to be burnt before the dissolution of parliament.

The king had been for some time subject to fits, which continued to increase, and gradually brought him to his end. He expired at Wiltshire in 1413, in the 46th year of his age, and the 13th of his reign. He was succeeded by his son Henry V., whose talents and character had at first occasioned unreasonable jealousies in the mind of his father, so that he thought proper to exclude him from all share of public business. The active spirit of Henry being thus restrained from its proper exercise, broke out in every kind of extravagance and dissipation. It is even reported, that, when heated with liquor, he scrupled not to accompany his riotous associates in attacking the passers on the streets and highways, and robbing them of their goods. No sooner, however, did he ascend the throne, than he desired to join his former companions, acquainted them with his intended reformation, exhorted them to imitate his example; but strictly prohibited them, till they had given proofs of their sincerity in this particular, to appear any more in his presence; after which, he dismissed them with liberal presents. His father's wife minsters, who had checked his riots, found that they had, unknown to themselves, been paying the highest court to their sovereign; and were received with all the marks of favour and confidence. The chief justice, who had formerly imprisoned the prince himself, and therefore trembled to approach the royal presence, met with praefes...
praises instead of reproaches for his past conduct, and was exhort to persevere in the same rigorous and impartial execution of the laws. The king was not only anxious to repress his own misconduct, but also to make amends for those iniquities into which policy or necessity of affairs had betrayed his father. He expressed the deepest sorrow for the fate of the unhappy King Richard, and even performed his funeral obsequies with pomp and solemnity, and heaved uppers upon all those who had thrown themselves attached to him. He took into favour the young earl of March, though his competitor for the throne; and gained so far on his gentle and unambitious nature, that he remained ever after fincerely attached to him. The family of Piercy was restored to its fortune and honours; and the king seemed defirous to bury all distinctions in oblivion. Men of merit were preferred, whatever party they had been of; all men were unanimous in their attachment to Henry; and the defects of his title were forgot amid the personal regard which was universally paid him.

The only party which Henry was not able to overcome was the new foes of Lollard, or reformers of religion. These were now gaining such ground in England, that the Romish clergy were greatly alarmed, and Henry was determined to execute the laws upon them. The head of that party at present was Sir John Oldcastle, Lord Cobham; a nobleman who had distingushed himself by his valour and military talents on many occasions, and acquired the esteem both of the late and present king. His high character and zeal for the new faith pointed him out to Arundel Archbishops of Canterbury as a proper object of ecclesiastical fury, and therefore he applied to Henry for permission to indict him. The king desired him first to try gentle methods, and undertook to converse with Lord Cobham himself upon religious subjefts. He did so, but could not prevail, and therefore abandoned Cobham to his enemies. He was immediately condemned to the flames; but having found means to make his escape, he raised an insurrection; which was soon suppressed, without any other consequence than that of bringing a stain upon the feet of King Cobham himself. He made his escape, but four years afterwards was taken and executed as a traitor. Immediately after, the most severe laws were enacted against the Lollards. It was enacted, that whoever was convicted of Lollardy, besides suffering capital punishments according to the laws formerly established, should also forfeit his lands and goods to the king; and that such were created, justice of the two benches, sheriffs, justices of the peace, and all the chief magistrates in every city and borough, should take an oath to use their utmost endeavours for the extirpation of herefy.

Notwithstanding these terrible laws, the very parliament which enacted them, namely, that of 1414, when the king demanded a supply, renewed the offer formerly pressed upon Henry IV. and intreated the king to seize all the ecclesiastical revenues, and convert them to the use of the crown. The clergy were greatly alarmed. They could offer the king nothing of equal value. They agreed, however, to confer on him all the priories alien, which depended on capital abbey in Normandy, and which had been bequeathed to them when that province was united to England. The moft effectual method, however, of warding off the blow at present was by pursuing the king to undertake a war with France, in order to recover the provinces in that kingdom which had formerly belonged to England. This was agreeable to the dying injunction of Henry IV. He advised his son never to let the English remain long in peace, which was apt to breed intestine commotions; but to employ them in foreign expeditions, by which the prince might acquire honour, the nobility in sharing his dangers might attach themselves to his person, and all the refüets spirits find occupation for their inquietude. The natural disposition of Henry sufficiently inclined him to follow this advice, and the civil disorders of France gave him the fairest prospect of success. Accordingly in 1415, France invaded France at the head of 30,000 men.

The great progress he made there is related at length under the article France. He had espoused the king’s daughter, and conquered the greatest part of the kingdom. His queen was delivered of a son named Henry, whose birth was celebrated by the greatest rejoicings both at London and Paris; and the infant prince seemed to be universally regarded as heir to both monarchies. But Henry’s glory, when it seemed to be approaching the summit, was blasted at once by death, and all his mighty projects vanished. He was seized with a fit, a diftemper which at that time the physicians had not skill enough to cure; and he expired on the 31st of Death of Death of Augst 1422, in the 34th year of his age, and the 10th of Henry V. of his reign.

Henry VI. succeeded to the throne before he was Henry VI. quite a year old, and his reign affords only the most dismal accounts of misfortunes and civil wars. His relations very soon began to dispute about the administration during the minority. The duke of Bedford, one of the most accomplished princes of the age, was appointed by parliament protector of England, defender of the church, and chief counsellor to the king. His brother, the duke of Glocefter, was fixed upon to govern in his absence, while he conducted the war in France; and in order to limit the power of both brothers, a council was named, without whose advice and approbation no measure could be carried into execution.

The kingdom of France was now in the most desperate situation. The English were masters of almost the whole of it. Henry VI. though but an infant, was solemnly invested with regal power by Legates from Paris; so that Charles VII. of France succeeded only to a nominal kingdom. With all these great advantages, however, the English daily lost ground; and in the year 1450 were totally expelled from France. It may easily be imagined, that such a train of bad successes would produce discomfits among the rulers at home. The duke of Glocefter was envious of many on account of his high station. Among these was Henry Beaufort, bishop of Winchester, great uncle to the king, and the legitimate son of John of Gaunt brother to Richard II. The prelate, to whom the care of the king’s education had been committed, was a man of great capacity and experience, but of an intriguing and dangerous disposition. He had frequent disputes with the Duke of Glocefter, over whom he gained several advantages on account of his own temper. The duke of Bed-

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Married to Margaret of Anjou.

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Duke of Gloucester murdered.

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Maiden of Anjou, daughter of Regnier, titular king of Sicily, Naples, and Jerusalem; but without either real power or poffessions. She was considered as the most accomplished princess of the age, both in mind and perfon; and it was thought would, by her own abilities be able to supply the defects of her husband, who appeared weak, timid, and superfluous. The treaty was therefore hastened on by Suffolk, and fear after ratified in England. The queen came immediately into the bishop's presence: Gloucester was deprived of all real power, and every method taken to render him odious to the public. One step taken for this purpose was to accuse his duchess of witchcraft. She was charged with converting with one Roger Bolingbroke, a priest and reputed accomplice; and also with one Mary Gondermain, who was said to be a witch. It was affirmed that these three in conjunction had made an image of the king in wax, which was placed before a gentle fire; and as the wax dissolved, the king's strength was expected to wane; and upon its total dissolution, his life was to be at an end. This accusation was readily believed by that part of the nation which had in it the seeds of a prodigious weakness; and the prisoners were pronounced guilty; the duchess was condemned to appear under a perpetual imprisonment: Bolingbroke the priest was hanged, and the woman burnt in Smithfield.

The bishop, called also the Cardinal of Winchester, was resolved to carry his resentment against Gloucester to the utmost. He procured a parliament to be summoned, not at London, which was too well affected to the duke, but at St. Edmondbury, where his adherents were sufficiently numerous to overawe every opponent. As soon as Gloucester appeared, he was accused of treason and thrown into prison; and on the day on which he was to make his defence, he was found dead in his bed, though without any signs of violence upon his body.

The death of the duke of Gloucester was universally ascribed to the Cardinal of Winchester, who himself died six weeks after, telling the utmost remorse for the bloody scene he had acted. What share the queen had in this transaction, is uncertain; but most people believed that without her knowledge the duke's enemies durst not have ventured to take away his life. The king himself shared in the general ill-will, and he never had the art to remove the suspicion. His incapacity also began every day to appear more clearly, and a pretender to the throne soon made his appearance.

In the year 1450, Richard Duke of York began to think of preferring his claims to the crown. All the York's title males of the house of Mortimer were extinct; but to the Anne, the sister of the last Earl of March, having espoused the Earl of Cambridge, who had been beheaded for treason in the reign of Henry V. had transmitted her latent, but not yet forgotten claim, to her son Richard. This prince, descended by his mother from Philippa only daughter of the duke of Clarence, second son of Edward III. stood plainly in order of succession before the King; who derived his descent from the duke of Lancaster, third son of that monarch. The duke was a man of valour and abilities, as well as of some ambition; and he thought the weaknesses and unpopularity of the present reign afforded a favourable opportunity to affect his title. The enmity of Henry was a white rose, that of Henry a red one; and this gave names to the two factions, who were now about to drench the kingdom in blood.

After the Cardinal of Winchester's death, the Duke of Suffolk, who also had been concerned in the affairs of Gloucester, governed every thing with unbounded sway. His conduct soon excited the jealousy of the other nobility, and every odious and unsuccessful measure was attributed to him. The duke, however, imagining that his crimes were of such a nature as could not be proved, boldly called upon his enemies to show an instance of his guilt. The house of Commons immediately opened against him a charge of corruption, tyranny, and treason. He was accused of being the cause of the loss of France; of perfiling the French king, with an armed force, to invade England; and of betraying the secrets of state. The popular resentment against him was so strong, that Henry, in order to secure him as much as possible, sentenced him to five years banishment. This was considered by his enemies as an escape from justice. The captain of a ship was therefore engaged to intercept him in derelict, and get him to the possession of the king.

And murder.

The complaints against Henry's government were infuriated by the misgovernment of John Cade, a native of Ireland. He had been obliged to fly into France for his crimes: but, on his return, seeing the people prepared for violent measures, he assumed the name of Mortimer, and, at the head of 20,000 Kentish men, advanced towards Blackheath. The king sent a message to demand the cause of their rising in arms. Cade in the name of the community answered, That their only aim was to punish evil ministers, and procure a redress of grievances for the people. On this a body of 15,000 troops were levied, and Henry marched with them in person against Cade, who retired upon his approach, as if he had been afraid of coming to an engagement. He lay in ambush, however, in a wood; not doubting but he should be pursued by the king's whole army: but Henry was content with sending a detachment after the fugitives, and returning to London himself; upon which Cade fled from his ambush, and cut the detachment in pieces.
Eng. Soon after, the citizens of London opened their gates to the victor; and Cade, for some time maintained great order and regularity among his followers. He always led them out into the fields in the night-time, and published several edicts against plunder and violence, of any kind. He was not, however, long able to keep his people in subjection. He beleaguered the treasurer Lord Say, without any trial; and soon after, his troops committing some irregularities, the citizens resolved to shut their gates against him. Cade endeavouring to force his way, a battle ensued, which lasted all day, and was ended only by the approach of night. The Archbishop of Canterbury, and the chancellor, who had taken refuge in the Tower, being informed of the situation of affairs, drew up, during the night, an act of amnesti, which was privately dispersed among the rebels. This had such an effect, that in the morning Cade found himself abandoned by his followers; and retreating to Rochester, was obliged to fly alone into the wood. A price being set on his head by proclamation, he was discovered and slain by one Alexander Eden; who, in recompence for his service, was made governor of Dover castle.

The court now began to entertain suspicions that the intestine of John Cade had not happened merely in consequence of his own machinations and ambition, but that he had been instigated thereto by the Duke of York, who, as we have already seen, pretended a right to the crown. As he was about this time expected to return from Ireland, and a report took place that he was now to assert his supposed right by force of arms, orders were issued in the king’s name to deny him entrance into England. This was prevented by his appearing with no more than his ordinary attendants; but though he thus escaped the danger for the present, he instantly saw the necessity of proceeding in support of his claim. His partizans were instructed to distinguish between his right by succession and by the laws of the kingdom. The adherents of Lancaster maintained, that though the advancement of Henry IV. might be looked upon as irregular, yet it was founded upon general consent; or even allowing it to have been at first invalid, it had now been for a long time established, and acquired solidity of consequence; nor could the right of succession at any rate be pleaded for the purpose of overthrowing the general peace and tranquillity of the kingdom. The principles of liberty as well as the maxims of true policy had been injured by the house of York; while the public were bound to those of Lancaster, not less by political than moral duty, in consequence of the oaths of fealty that had been so often sworn to them; the Duke of York himself having repeatedly sworn allegiance to them, and thus indirectly renounced those claims which he now brought forward to disturb the public tranquillity. On the part of the Duke of York, it was replied, that the good of the people required the maintenance of order in the succession of princes; that, by adhering constantly to this rule, a number of inconveniences would be prevented which must otherwise ensue; and though that order had been broken through in the case of Henry IV. it was never too late to remedy any pernicious precedent. It would indeed be a great encourage-
and his parliament, the Duke of York raised an army of 10,000 men, with whom he marched towards London, demanding a reformation in matters of government, and the removal of the Duke of Somerset. This first enterprise, however, proved unsuccessful; the gates of the city were shut against him, and he was parried by the king at the head of a superior army. On this he retired into Kent; and as there was a number of his own friends in the army of the king, a conference took place, in which Richard still insisted upon the removal of the Duke of Somerset, and his submitting to be tried in parliament. This request was in appearance complied with, and Somerset arrested: the Duke of York was then permitted to wait upon the king in his royal pavilion; but, on repeating his charge against the duke, he was surprised to see the latter come out from behind the curtain, and offer to maintain his innocence. Richard perceiving that he had not sufficient interest to ruin his adversary, pretended to be satisfied, and retired to his seat at Wigmore in Wales; and during the time he resided there, a better opportunity was given him of accomplishing his designs than he could have hoped for. The king fell into a kind of lethargic disorder, which increased his natural immobility to such a degree, that he could no longer retain a shadow of royalty. Richard now had interest enough to get himself appointed protector, with power to hold parliaments at pleasure; with which high office he was not so soon invested, than he turned out all the Lancastrian party from their offices, and sent the Duke of Somerset to the Tower: but on the recovery of the king, which happened in no long time after, he himself was dismissed from his employment, the Duke of Somerset released, and the administration once more put into his hands. On this the duke of York levied an army, merely, as he pretended, to enforce the reformation of government and the removal of the Duke of Somerset. Thus Henry, though sore against his will, was obliged to face him in the field. A battle ensued at St Alban's; in which the Yorkists were defeated, and the Duke of Somerset, the chief partizan of their cause, killed in the action. The king himself was wounded, and took shelter in a cottage near the field of battle; where he was taken prisoner, but was afterwards treated with great respect and kindness by the Duke of York.

Henry, though he was now only a prisoner treated with the forms of royalty, was nevertheless pleased with his situation; but his queen was a woman of a bold and masculine spirit, could not bear to have only the appearance of authority, while others enjoyed all the real power. She therefore excused the king once more to assert his right by force of arms; and after several manoeuvres, the Duke of York was obliged to retire from court. A negotiation for peace was at first set on foot, but the mutual distrusts of both parties soon broke it off. The armies met at Blore Heath on the borders of Staffordshire, on the 23d of September 1459; and the Yorkists at first gained some advantages. But when a more general engagement was about to ensue, a body of veterans who served under the duke of York defected to the king; and this so intimidated the duke's party, that they separated the next day without striking a blow. The
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Edward IV.

After this, he advanced to London; and being joined by the remainder of Warwick's army, he soon obliged Margaret to retire, entered the city amidst the acclamations of the people, and was crowned king on the 5th of March 1461.

Notwithstanding all her misfortunes, however, Margaret still continued undaunted. She retired to the north, where she was soon joined by such numbers, that her army amounted to 60,000 men. She was opposed by young Edward and Warwick at the head of 40,000; and both armies met near Toulon in the county of York, on the 29th of March 1461. A bloody battle ensued, in which the queen's army was totally defeated; and as Edward, prompt by his natural cruelty, had ordered no quarter to be given, 40,000 of the Lancastrians were slain in the field or in the pursuit. Edward is said to have gained this victory by means of a violent storm of snow, which blew full in the face of the queen's army, and so blinded them that they could scarce make any use of their arms. After this disaster the queen fled to Scotland with her husband and son; and notwithstanding all the misfortunes she had already met with, resolved once more to enter England at the head of 5000 men. She was granted her by the king of France. But even here she was attended by her usual bad fortune. Her little fleet was dispersed by a tempest, and herself escaped with the utmost difficulty by entering the mouth of the Tweed... Soon after, a defeat, which her few forces sustained at Hextham, seemed to render her cause entirely desperate; and the cruelties practised upon all her adherents rendered it very dangerous to befriend her.

By these repeated misfortunes the house of Lancaster was so effectually ruined, that Margaret was obliged to separate from her husband, and both of them to shift for themselves the best way they could. The king was still protected by some of his friends, who conveyed him to Lancashire, where he remained in safety for a twelvemonth; but being at last discovered, he was thrown into the Tower and kept close prisoner. The queen fled with her son to a forest, where she was seized upon by robbers, who stripped her of her rings and jewels, treating her otherwise with the utmost indignity... A quarrel which happened amongst them about the division of the spoil afforded her an opportunity of escaping from their hands into another part of the forest, where she wandered for some time without knowing what to do. At last, when quite spent with hunger and fatigue, she saw a robber coming up to her with a drawn sword in his hand. Finding it altogether impossible to escape, she suddenly took the resolution of putting herself under his protection. Advancing towards him therefore, and presenting the young prince, "Here (says she), my friend, I commit to your care the safety of your king's son." This address so much surprised the robber, that, instead of offering her any injury, he professed himself entirely devoted to her service. After living for some time concealed in the forest, she was at last conducted to the sea-side, where she found a ship which conveyed her to Flanders. On her arrival there, she went to her father's house, who, though very poor, gave her such entertainment as he could afford; and in this retreat she laid some years in expectation of finding an opportunity of retrieving her affairs.

Edward, in the mean time thinking himself securely fixed on the throne, gave a loose to his favourite passions; one of which was an inmoderate love of women. To divert him from this, the Earl of Warwick, to whom he was indebted for his crown, advised him to marry. Edward consented, and sent him over to the continent to negotiate a match with the princesses of Savoy. The negotiation proved unsuccessful; but, in the mean time, the king had privately espoused Elizabeth Woodville, daughter of Sir Philip Woodville, who had married the duchess of Bedford after the death of her first husband. Edward had employed his arts of seduction against his lady in vain before he married her; but unfortunately the match was concluded just at the time that the Earl of Warwick had proved successful in his negotiation with the princesses of Savoy. The minister therefore returned full of indignation against his sovereign; and Edward, forgetting how great a cause he had to be offended, determined to remove him entirely from his councils. Warwick was likewise dissatisfied by the favour shown to the queen's party; which, though certainly a piece of very commendable policy in Edward, was entirely disagreeable to the ambitious disposition of that nobleman. A plan of revenge was therefore thought of; and a most powerful combination was formed against Edward to accomplish which, Warwick not only employed his own influence, which was very extensive, but likewise that of the Duke of Clarence, Edward's brother, to whom the Earl had allied himself by giving his daughter in marriage; after which he persuaded him to embrace his cause. Some circumstances which took place about this time also favoured the scheme. The inhabitants of St Leonard's in Yorkshire complained, that the duties levied for that institution, and which had been originally appointed for An infamous purpose, were secreted by the managers, who refused to contribute their part. As the clergy were concerned in this affair, they attempted to silence their antagonists by ecclesiastical fulminations against them; upon which the latter took up arms, fell upon the officers of the hospital, and having massacred them, proceeded towards York, to the number of 15,000. In the first skirmish they had the misfortune to lose their leader, who was instantly executed. The rebels, however, still continued in arms, and a short time appeared in such numbers as to become formidable to government. Henry Earl of Pembroke was sent against them with a body of 5000 men; and having taken Sir Henry Nevil, one of the leaders of the insurgents, prisoner, instantly put him to death; but this was soon revenged by a similar execution on himself, who happened to be defeated and taken prisoner a short time after. This defeat had been occasioned by a disagreement betwix the Earls of Pembroke and Devonshire; in consequence of which the latter had gone off with his troops, leaving Pembroke to shift for himself the best way he could. The king, enraged at this, caused Devonshire to be executed in a like summary manner; but this was no service to his cause; a new body of insurgents appeared under Sir Robert Wells, son to a nobleman of that name. The latter, in order to secure himself from all suspicions of disloyalty, fled to a monastery; but he was soon enticed from thence and put to death by the insinuations of his lord Edward, whose treachery was equal to his cruelty. His son...
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soon after shared the same fate, being defeated and taken prisoner by Edward, who instantly ordered him to be beheaded, along with Sir Thomas Lauce and other persons of distinction.

Notwithstanding such an appearance of a general insurrection, the king had so little affection of the loyalty of Warwick and Clarence, that he employed them in raising troops to quell the disturbance, and executing their commissions with fidelity; however, they joined the malecontents with all the forces they could raise; but being quite disinclined by the defeat and death of Sir Robert Welle, they retired to Lancashire, in hopes of being joined by Lord Stanley, who had married the Earl of Warwick's sister. Being disappointed in this, they were obliged to disband their army, and fly into Devonshire, whence they set sail for Calais. Upon their arrival on the continent, matters seemed about to be much mended: the deputy-governor, whom Warwick had left, refused him admittance; nor would he even allow the Dukes of Clarence to land, though he had been delivered of them; but being quite an assurance to the French monarch, however, with the uncertainty of the affairs of England at that time, he afterwards made an apology for Warwick for his behaviour. The latter pretended to be easily reconciled; but immediately left the place, having seized some Flemish vessels which he found lying in the neighbourhood. The Earl had been accommodated, a fleet was prepared to fly the kingdom. Having narrowly escaped an attempt made upon his person by the Marquis of Montague, he embarked on board a small fleet which lay off Lynn in Norfolk. While at sea he was chased by some ships belonging to the Hans Towns that were then at war both with France and England; but at length, having escaped all dangers, Edward landed safely in Holland, where he met with but an indiffereent reception from the Duke of Burgundy, with whom he had lately entered into an alliance.

Warwick in the mean time advanced to London, and once more released and placed on the throne the miserable King Henry VI. A parliament was called, which very solemnly confirmed Henry's title to the throne, and Warwick himself was dignified by the people with the title of the king-maker. All the adherents of the Lancastrians were restored; and every one was restored who had lost either honours or fortune by his former adherence to Henry's cause. All the adherents of Edward fled to the continent, or took shelter in monasteries, where they were protected by the ecclesiastical privileges. But Edward's party was not yet destroyed. After an absence of nine months, being seconded for a small body of troops granted him by the Duke of Burgundy, he made a descent at Ravenpur in Yorkshire. At first he met with little success; but his army increasing on his march, he was soon in a condition to appear before the capital, which immediately opened its gates.

The unfortunate Henry was thus again plucked from the throne; and the hopes of Warwick were almost totally blasted by the defection of Clarence, Edward's brother. Nothing now remained but to come to an engagement as soon as possible. Warwick knew his forces to be inferior to those of Edward, but placed great dependence on his own generalship. He therefore advanced to Barnet, within ten miles of London, where he resolved to wait the coming of Edward. The latter soon came up with him, and on the 14th of April 1471, a most obstinate and bloody battle was fought. Edward, according to custom, had ordered no quarter to be given; and obtained the victory through a mistake of a body of Warwick's forces, which fell with fury on their own party instead of the enemy. The earl himself was slain, together with his brother, and 10,000 of his brave followers.

The queen was just then returned with her son from France, where she had been soliciting supplies. She had scarce time to refresh herself from the fatigues of the voyage, when she received the fatal news of the death of Warwick, and the total destruction of her party. All her resolution was not able to support her under such a terrible disaster. Her grief now for the first time, it is said, manifested itself by her tears; and the immediately took sanctuary in the abbey of Beautility in Hampshire. Here she still found some friends willing to assist her. Tudor Earl of Pembroke, Courtney earl of Devonshire, the lords Wenlock and St John, with some other men of rank, encouraged her yet to hope for success, and promised to stand by her to the last. On this assurance, she resumed her courage; and advancing through the counties of Devon, Somerset, and Gloucester, increased her army every day. At last, however, she was overtaken by Edward with his victorious army at Twykebury, on the banks of the Severne. The queen's army was totally defeated; the Earl of Devonshire and Lord Wenlock were killed in the fray the field; the Duke of Somerset, and about 20 other per- sons of distinction, who had taken shelter in a church, were surrounded, dragged out, and immediately be- headed; about 3000 of their party fell in battle, and the army was entirely dispersed. Queen Margaret and her son were taken prisoners, and brought to the king, who asked the prince in an indulgent manner, how he dared to invade his dominions! The young prince replied, that he came thither to claim his just inheritance; upon which Edward struck him on the face with his gauntlet. The Dukes of Clarence and Glocester, Lord Haflings, and Sir Thomas Gray, taking this blow as a signal for further violence, hurried the prince into the next apartment, and there dispatched him with their
England. their daggers. Margaret was thrown into the Tower along with her husband Henry, who expired in that confinement a few days after. It was universally believed that he was murdered by the Duke of Gloucester, though of this there was no direct evidence. Margaret was ranoned by the king of France for 50,000 crowns, and died a few years after in a most miserable situation.

Edward being now freed from all his enemies, began to inflict punishment on those who had formerly appeared against him. Among the cruelties he committed, that on his brother the Duke of Clarence was the most remarkable. The king happening to be one day hunting in the park of Thomas Burdet, a servant of the duke killed a white buck which was a great favourite of the owner. Burdet, vexed at this, went to the king and related all that happened. Among the cruelities he found guilty, and condemned to death. The only mercy granted him was to have the choice of his death; though of this there was no evidence.

On the death of Edward IV, the kingdom was divided into two new factions. The queen's family, which during the last reign had come into power, was become obnoxious to the old nobility, who considered them as their inferiors. The king had endeavoured to prevent these animosities from coming to a height, by defining on his death-bed that his brother Richard should be made protector of the realm; and recommending peace and unanimity among the minority of his son. But the king was no sooner dead than the former resentment between these parties broke out with violence; and the duke of Gloucester, who was endued with almost every bad quality, resolved to profit by their contentions. His first step was to get himself declared protector of the realm; and having arrested the earl of Rivers, the king's uncle and guardian, he met young Edward in his way from Ludlow castle, where the late king had refided during the latter part of his reign, and respectfully offered to conduct him to London. Having thus secured the person of the king, he next got possession of his brother's person and estate, and immediately retired with this child and the other princes to Westminster abbey; and it was not without extreme regret that he delivered him up at the intercession of the prince and archbishop of York.

In a few days after Gloucester had made himself master of the persons of the two princes, he had them confined in the Tower, under pretence of guarding them from danger; and soon after spread reports of their illegitimacy, and by pretended obstructions put off the young king's coronation. Lord Stanley first began to suspect his designs; and communicated his suspicions to Lord Hastings, who had long been firmly attached to the king's family. Lord Hastings would not at first give credit to this surmise; but he very soon had a fatal proof of the truth of what had been communicated to him. On the 13th of June 1483, he was hurried out of the council-room in the Tower by Gloucester's order, and beheaded on a log of timber. The soldiers who carried him off made a buflle as though an attempt had been made to rescue him, and one of them discharged a blow at Lord Stanley's head with a pole-axe; but he happily escaped by shrinking under the table. The same day were executed the Earl Rivers, and some others, who had committed no other crime than being faithful to the young king.

The protector now thought he might with safety lay claim to the throne. He had previously gained over the duke of Buckingham, a nobleman of great influence among the people. He used his utmost endeavours to inspire the people with a notion of the illegitimate birth of the late king, and consequently of his children. Dr Shaw, a popular preacher, was also hired to hand out the people to the fame purpose from St Paul's cross. Having expatiated on the inconstancy of the queen, and the illegality of the young king's title, he then made a panegyric on the virtues of the protector. "It is the protector (continued he) who carries in his face the image of virtue, and the marks of a true defcent. He alone can restore the lost glory and honour of the nation." It was hoped that upon this occasion some of the populace would have cried out, "Long live King Richard!" but the audience remaining silent, the duke of Buckingham undertook in his turn to persuade them. Having expatiated on the calamities of the late reign and the illegitimacy of the present race, he told the people, that he saw only one method of warding off the miseries which threatened the state, which was by electing the protector; but he seemed apprehensive that he would never be prevailed upon to accept a crown accompanied with such difficulty and danger. He next asked his auditors, whether they would give credit to this surmise; but his wish was not without extreme regret that he delivered him up at the intercession of the prince and archbishop of York.

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He accepted the government of England and France, with a resolution, as he said, to defend the one and subdue the other.

Richard III. The first step taken by the new king was to send orders to Sir Rob. Brackenbury governor of the Tower, to put the young princes to death. But this he refused; and successively answered, that he knew not how to embrace his hands in innocent blood. A fit instrument for this purpose, however, was not long wanting. Sir James Tyrrel readily undertook the office; and Brackenbury was ordered to reign the keys to him for one night. Tyrrel choosing three associates, Slater, Deighton, and Forell, came in the night-time to the door of the chamber where the princes were lodged; and finding in the affiffins, bid them execute their commissione, while he himself stood without. They found the young princes in bed, and fallen into a sound sleep. The affiffins smothered them with the bolster and pillows; after which they showed their naked bodies to Tyrrel, who ordered them to be buried at the fair foot under an heap of stones. (c)

Richard having thus secured himself on the throne by the most inquisitive methods, attempted to strengthen his interest by foreign alliances, and procuring the favour of the clergy at home by grant indulgences; but he found his power threatened from a quarter where he least expected an attack. The duke of Buckingham, who had been so instrumental in raising him to the throne, did not think himself properly rewarded. He made a demand of some confiscate lands in Hereford, to which his family had an ancient claim. Richard either reluctantly complied with his request, or only granted it in part; so that a coolness soon ensued between them, and in a little time Buckingham came to a resolution of dethroning the monarch whom he had just raised. For some time he remained in doubt, whether he should assume the crown himself or set up another. At length he determined on the latter; and resolved to declare for Henry, earl of Richmond, who was at that time an exile in Brittany, and was considered by the court, several times, as the only surviving branch of the house of York.

Buckingham determined to support the claim of the earl of Richmond to the throne. He was one of those who had the good fortune to escape the numerous massacres of the former reign; but as he was a descendant of John of Gaunt by the female line, he was for that reason obnoxious to those in power. He had long lived in exile, and was once delivered over to the ambassadours of Edward IV., who were preparing to carry him to England; when the duke of Brittany, who delivered him, repented of what he had done, and took him from the ambassadours just as they were carrying him on shipboard. His right to the crown by succession was very doubtful; but the cruel behaviour of Richard inclined the people in general greatly to favour him; and, to give an additional strength to his title, a match was projected between him and the princess Elizabeth, the eldest daughter of Edward IV., which, by uniting the two rival families, would put an end to those discontents which had so long filled the kingdom with bloodshed and confusion. Richard, in the mean time, from some reasons which have not been particularlyized by historians, began to entertain doubts of the fidelity of Buckingham, and determined to cut him off. For this purpose he sent for him to court: but Buckingham, instead of obeying the summons, fled into Wales, where he raised a considerable army, and was with justice any encampation of the Severn which lasted 10 days, his troops were so disheartened at this event, that they almost all deserted him. The duke was therefore obliged to fly in defiance, and Richard instantly set a price upon his head. Buckingham was now obliged to trust his life in the hands of an old servant of his own, named Bennis; but this man, tempted by the great sum of the reward, betrayed him to the sheriff of Shropshire, by whom he was seized and conducted to Richard at Salisbury, who caufed him to be executed without delay. The earl of Richmond, in the mean time, had yet faff from St. Malo's with a body of 5000 men: but after his arrival in England, receiving the disagreeable news of Buckingham's misfortune, he fell again for Bretagne; while Richard, emboldened by the bad success of his enemies, determined to confirm his title to the throne by calling a parliament, which till this time he had not ventured to do. At present, matters were so circumstanced, that the parliament had no other resource than to comply with his desires, and acknowledge his right to the crown. An act was passed confirming the illegitimacy of Edward's children; and an attainder was also confirmed against the earl of Richmond; the duties of tonnage and poundage were granted to the king for life; and his only son Edward, then about 12 years of age, was created Prince of Wales. In return for these concessions, Richard passed several popular laws, particularly against the extorting of money by benevolences, and some others calculated to gain the good will of the opposite party. He paid his court also to the queen-dowager with such affability and success, that the left her sanctuary, and put herself and her daughters into his hands. The ambition and cruelty of this man indeed are said to have extinguished every sentiment of natural affection as well as humanity. He had married Anne, the second daughter of the earl of Warwick, and widow of Edward prince of Wales, whom he himself had murdered; but having born him but one son, who died about this time, he considered her as an insurmountable obstacle to the accomplishment of his design; for which reason it was thought he intended to put an end to her life by poison; and as he knew that the projected match between the earl of Richmond and the Princess Elizabeth could only make the rivalship of the former any way formidable, he resolved to obtain a dispensation.

(c) These circumstances are said to have been conflolled in the succeeding reign, though the perpetrators escaped punishment. The bodies of the two princes were fought for without any succors under the reign of Henry VIII. but in the time of Charles V., the bones of two persons answering to their age were found in the spot where they were said to have been buried; which, being supposed to be the remains of these two unfortunate youths, they were buried under a marble monument in Westminster Abbey.
The queen-dowager is even said to have come into this scheme with a view to recover her power; but the prince's herself always rejected his addresses with abhorrence. The refusal of the princes occasioned no small perplexity in Richard; and before he could determine on any proper method of accomplishing his purpose, he received news of Richmond's preparations for landing in England. These being soon accomplished, Henry set sail from Harfleur in Normandy, and landed without opposition, on the 17th of August, 1485, at Milford-haven in Wales. Richard in the mean time, not knowing where the invasion was to take place, had posted himself at Nottingham; which being almost in the centre of the kingdom, was therefore proper for resisting any invader. Sir Rice ap Thomas and Sir Walter Herbert were commissioned by Richard to oppose his rival in Wales; but the former immediately deferred to him, and the latter made but a very feeble resistance. Richard instantly resolved to meet his antagonist, and to risk every thing on the event of a battle. Richmond, though he had not above 6000 men, and the king near double that number, did not decline the combat; being chiefly encouraged by the promises of Lord Stanley to join him with a body of 7000 men, and with whom he hovered at a little distance from the intended field of battle, seemingly determined to join either side.

The king having commanded his army to form themselves in order of battle, intrenched the van to the duke of Norfolk, while he himself, with the crown on his head, took the command of the main body. Lord Stanley in the mean time posted himself on one flank between the two armies, while his brother Sir William took his station directly opposite. As his intention of either joining the enemy or keeping neutral during the time of the engagement was now far from being doubtful, Richard sent him orders to join the main body, which not being complied with, the tyrant determined to put to death Stanley's son, who had been left with him as a pledge of his father's fidelity. He was persuaded, however, to defer the execution till after the engagement, that Stanley might thereby be induced to delay his purpose in joining the enemy. This, however, did not answer the expectation. Soon after the engagement begun, Volo took refuge to Richard's party, and joining Richmond entirely decided the fortune of the day. The tyrant perceiving his situation to be quite desperate, and seeing his rival at no great distance from him, drove up against him with fury, in hopes that either Henry's death or his own would decide the victory between them. He killed Sir William Brandon the earl's standard-bearer; he dismounted Sir John Cheyne; and was within reach of Richmond, when Sir William Stanley breaking in with his troops, Richard was surrounded and overwhelmed by numbers. His body was found in the field, covered with dead enemies, and befmeared with blood. It was thrown carelessly across a hedge, carried to Leicester amidst the shouts of insulting speculators, and interred in the Gray-Friar's church of that place.

The usurper's crown being found on the field of battle, was placed on the head of the conqueror, while the whole army cried out, "Long live king Henry!" Two days after the battle, Henry gave orders to crown Edward Plantagenet earl of Warwick, and son of England the unfortunate duke of Clarence; and to release the Princess Elizabeth, who had been confined in the tower. He then advanced by slow and gradual marches to the city of London, where he was received with the greatest demonstrations of joy. He was crowned king of Henry VII. England on the 30th of October 1485; and, to heighten the splendor on that occasion, he bestowed the rank of knights-baillonet on 12 persons, and conferred peerages on three. Jasper earl of Pembroke, his uncle, he created duke of Bedford; Thomas Lord Stanley, his father-in-law, earl of Derby; and Edward Courtenay, earl of Devonshire. At the coronation likewise appeared a new institution, which the king had established for personal security as well as pomp; a band of 50 archers, who were denominated Yeomen of the Guard. But lest the people should take umbrage at this step, as if it implied a difference of his subjects, he declared the institution to be perpetual. The ceremony of the coronation was performed by cardinal Bourchier, archbishop of Canterbury.—On the 18th of January 1486, he was married to the Princess Elizabeth; and his marriage was celebrated at London with greater appearance of joy than either his first entry or his coronation had been. Henry remarked, with much displeasure, this general favour borne to the house of York; and the suspicions arising from it, not only disturbed his tranquility during the whole of his reign, but bred difficulty towards his comfort herself, and pained all his domestic enjoyments.

The reign of Henry VII. was for several years disturbed by plots and insurrections. The people, by a long course of civil war, had become turbulent and factious, that no governor could rule, nor could any king please them. The violent animosity expressed by the subjects of this monarch, however, against the house of York, may be considered as one of the causes of the extreme proneness to rebellion manifested by his subjects. Instead of endeavouring to conciliate the affections of the opposite party, he always strove to quell them by absolute force and violence. For this purpose he took a journey, soon after his accession, to the north of England, where the Yorkists were very numerous; hoping to get the better of them by his presence. In his journey thither, he received intelligence of an insurrection begun by Volo, against Richard and Thomas his brother, who had raised an army, and were marching to besiege the city of Worchester, and to suppress the insurrection cefer, while Volo approached to affiit them with a body of three or four thousand men. They were dispersed, however, by the intervention of a general pardon, which induced Volo to withdraw from his troops, who were thereupon obliged to submit to the king's mercy. The Yorkists took sanctuary in the church of Cointin near Abingdon; but as it was found that this church had not the privilege of protecting rebels, they were taken from thence : the elder was executed at Tyburn; but the younger pleading that he had been killed by his brother, received a pardon.

This success was soon after followed by the birth of a prince; whom Henry named in honour of the celebrated king Arthur, who is said to have been the direct ancestor of the house of Tudor. All this success, however, as well as the general satisfaction which the birth of a prince descended from the house both of York
York and Lancaster necessarily occasioned, were not sufficient to reconcile the hearts of the English to their soveraign. His extreme severity towards the house of York still continued; and unfortunately this was much more beloved by the generality of the nation, than that of Lancaster. Many of the Yorkists had been treated with great cruelty, and deprived of their fortunes under pretence of treason; a general rempufion had likewise been made of the grants made by the prince of the House of York. It was likewise universally believed that the queen dowager met with hard treatment, on account of her being one of that unfortunate house; and, from all these circumstances, it was not unreasonably imagined that her eminence was inveterate and invincible. Hence, notwithstanding his politic and vigorous administration, people made no scruple of openly expressing their disapprobation of his conduct and government; and one rebellion seemed to be extinguished only to give birth to another. The king had, at the commencement of his reign, confined the duke of Clarence's son, as has already been mentioned. This unfortunate youth, who had obtained the title of the earl of Warwick, was, through long confinement, entirely unacquainted with the affairs of the world. Simple as he was, however, he was now conducted entirely unacquainted with the affairs of the world. Simple as he was, however, he was now made use of to disturb the public tranquillity. The queen-dowager was with great reason suspected to be at the bottom of this conspiracy; but not choosing to interfere openly in the matter herself, she employed one Simon a priest of Oxford to execute her purposes. This man cast his eyes upon one Lambert Simnel a baker's son in the same place, a youth of only 15 years of age; but who from his graceful appearance and accomplishments, seemed proper for impersonating a man of quality. A report had been spread among the people, that Richard duke of York, second son of Edward IV, had secretly made his escape from the cruelty of his uncle, and lay somewhere concealed in England. Simnel had at first instructed his pupil to assume that name, which he found to be much the object of public affection; but hearing afterwards a new report, that Warwick had escaped from the Tower, and observing that this news was attended with no less general satisfaction, he changed the plan of his imposition, and made Simnel perfonate that unfortunate Prince. The plant youth was therefore directed by his instructer to talk upon many occurrences as happening to him in the court of Edward. But as the impostor was not calculated to bear a close examination, he was removed to Ireland; and so well had he profited by the leasons given him, that he so soon presented himself to the earl of Kildare the deputy, claiming his protection as the unfortunate earl of Warwick, than he began to consort with several other noblemen with regard to him. These expressed even a stronger belief in Simnel's story than the deputy himself had done; and in proportion as the story was spread abroad, the more credit it obtained. The impostor was lodged in the castle of Dublin; the inhabitants universally took an oath of allegiance to him, as the true descendant of the Plantagenets; he was crowned with a diadem taken from the statue of the effected virgin, and proclaimed king by the title of Edward VI; and the whole kingdom followed the example of the capital. Such an unexpected event alarmed Henry so much, that he would have gone over to Ireland on purpose to quell the rebellion in person, but he had not been afraid of the machinations of the queen-dowager in his abence. To prevent any thing of this kind, it was resolved to confine her for life in a monastery; under pretence, however, that it was done on account of her having formerly delivered up the princefs her daughter to King Richard. The queen murmured against the severity of her treatment; but the king perjured in his resolution, and she remained in confinement till the time of her death, which happened some years after. The next measure was to show Warwick to the people. He was taken from the Tower, and led thro' the principal streets of London; after which he was conducted in solemn procession to St Paul's, where great numbers were assembled to see him. Still, however, they proceeded in Dublin to honour their pretended monarch; and he was crowned with great solemnity in the presence of the earl of Kildare, the chancellor, and the other officers of state. At last, being furnished by the duchefs of Burgundy with a body of 2000 veteran Germans under the command of Martin Swart, a brave and experienced officer, he resolved to invade England. He landed in Lancashire, from whence he marched to York, expecting that the country-people would rise and join him on his march. But in this he was deceived: the people were unwilling to join a body of foreigners, and were besides kept in awe by the great reputation of Henry. Lord Lincoln, therefore, who commanded the rebel army, determined to bring the matter to a speedy issue. Accordingly he met the royal army at Stoke in the county of Nottingham. An obstinate engagement ensued, but at length King Henry obtained a complete victory. Lord Lincoln, with 4000 private men, perilled in the battle; and Simnel, with his tutor Simon were taken prisoners. Simon being a priest, could not be tried by the civil power, and was only committed to close confinement. Simnel was pardoned, and made a feällon in the king's kitchen, whence he was afterwards advanced to the rank of falconer, in which employment he died. Henry being now freed from all danger from that quarter, determined to take ample vengeance on his enemies. For this purpose he took a journey into the north; but though he found many delinquents, his natural avarice prompted him to exact heavy fines from them rather than to put them to death. His proceedings, however, were extremely arbitrary; the criminals being tried, not by the ordinary judges, but either by commissioners appointed for the occasion, or suffering punishment by sentence of a court-martial. Having thus fully established his authority as far as it could be done by suppressing and punishing domestie enemies, he next determined to recommend himself to his subjects by a report of his military disposition; hoping, that by undertaking, or pretending to undertake, some martial enterprises, he would thus gain the favour of a people naturally turbulent, and unaccustomed to live long at peace with their neighbours. He certainly had not, however, the least intention of postecting foreign conquests; though, to please the people, he frequently gave out that he designed to invade France, and lay waste the whole country, rather than not recover his continental possessions. Under these pretences particularly, that of affisting the Bretons whom the
England. King of France had lately subdued, and who had applied to him for relief, he persuaded his parliament to grant him a considerable supply; but this involved him in some difficulties. The counties of Durham and York, who had always been discontented with Henry's government, and still farther provoked by the oppressions under which they had laboured after the extinction of Simnel's rebellion, opposed the commissioners sent by the king to levy the tax. The latter applied to the earl of Northumberland, requesting his advice and assistance in the execution of their office; but instead of being able to enforce the levying of the tax, he himself was attacked and put to death by the insurgents. This act of violence committed by themselves, seemed to render the insurgents desperate, so that without more ado they prepared to resist the royal power, under the conduct of one Sir John Egremont; but in this ill-conducted and precipitate scheme they met with no success. Henry instantly levied a considerable force, which he committed to the charge of the earl of Shrewsbury; by whom the rebels were quickly defeated, and one of their leaders taken prisoner. Sir John Egremont fled to the duchess of Burgundy, who afforded him protection.

Thus Henry obtained the subsidy which he had solicited with pretence of invading France, though he would willingly have avoided any expense in preparations for that purpose in order to keep the money in his possession; but as the Bretons had applied to him for assistance, and their difficulties became every day more urgent, he found himself obliged to attempt something. With this view he set sail for Calais with an army of 25,000 foot and 1600 horse, of which he gave the command to the duke of Bedford and the earl of Oxford; but notwithstanding this apparent hostile disposition, negotiations for peace had been secretly begun, and commissioners even appointed to consider of the terms, three months before King Henry set out for the continent. As the love of money was the prevailing passion of the English monarch, and the possession of Bretagne was a great object to France, an accommodation soon took place between the contending parties. The king of France engaged to pay Henry near L.200,000 as a reimbursement for the expenses of his expedition, and stipulated at the same time to pay him and his heirs an annual pension of 25,000 crowns more.

Thus the authority of Henry seemed to be so firmly established, as to leave no reason to dread any rival in time to come; but still he found himself mistaken. The duchess of Burgundy, renouncing the deposition of her family, and exasperated by her frequent miscarriages in the attempts already made, resolved to make a final effort against Henry, whom the greatly hated. For this purpose, she propagated a report that her nephew Richard Plantagenet, duke of York, had escaped from the Tower where his eldest brother was murdered, and that he still lay somewhere concealed. Finding this report eagerly received, the king found a young man who assumed both his name and character. The person chosen to play this part was the son of one Oksford, or Warwick, a converted Jew, who had been in England during the reign of Edward IV. His name was Peter; but it had been corrupted after the Flemish manner into Perkin or Perkin. It was by some believed, that Edward, among his other amorous adventures, had a secret correspondence with Warbeck's wife, which might account for the great similarity of features between Perkin and that monarch. The duchess of Burgundy found this youth entirely suited to her purposes. The lemons the give him were easily learned and strongly retained. His graceful air, his courtly address, his easy manners, and elegant conversation, were capable of imposing upon all but those who were privy to the imposture. The kingdom of Ireland was pitched upon for Perkin's first appearance, as it had been before for that of Simnel. He landed at Cork; and immediately assuming the name of Richard Plantagenet, was followed by great numbers of credulous people. He wrote letters to the earls of Desmond and Kildare, inviting them to join his party; he dispersed every where the strange intelligence of his escape from his uncle Richard's cruelty; and his fiery meeting with general credit he soon became an object of the public favour. All those who were delighted with the king, prepared to join Perkin; but particularly those who formerly were Henry's favourites, and had contributed to place him on the throne. These, thinking their services had not been sufficiently repaid, now became heads of the conspiracy. Their attempts, however, were all frustrated by the vigilance of the king, and most of the conspirators of any note were publicly executed.

Perkin finding it was in vain to attempt anything in England, went to the court of James IV. of Scotland. Here he was received with great cordiality; and James carried his confidence in him so far, that he even gave him in marriage lady Catherine Gordon, daughter to the earl of Huntly, and a near kinswoman of his own. But when he attempted to set him on the throne of England, he found himself totally disappointed; and on the conclusion of peace between the two kingdoms, Perkin was obliged to leave Scotland. Thence he went to Flanders; and meeting with but a cool reception there, he resolved to try the affections of the people Cornwall, who had lately risen against the king on account of a new tax which had been levied upon them. On his first appearance, Perkin was joined by about 3000 of these people, with which force he laid siege to Exeter. Henry, however, having marched against him with a considerable army, Perkin's heart failed him, though his followers now amounted to 7000; and he took refuge in a monastery. His wife fell into the conqueror's hands; who placed her in a respectable situation near the queen's person, with a suitable pension, which she enjoyed till her death. Perkin being persuaded to deliver himself into the king's hand, was compelled to sign a confession of his former lies and conduct; but this was so defective and contradictory, that very little regard was paid to it. His life was granted him; though he was still detained in custody, and keepers were appointed to watch his conduct. From thence, however, he broke loose; and flying to the sanctuary of Shyne, put himself into the prior's hands. He was once more prevailed upon to trust himself in the king's hands, and was committed to the Tower; but having here entered into a correspondence with the earl of Warwick in order to make their escape, both of them were condemned and executed.

To Henry VII. in a great measure is owing the pre-
all along two points principally in view; the one to depress the nobility and clergy, and the other to exalt and humanize the populace. In the feudal times every nobleman was possessed of a certain number of vassals, over whom he had by various methods, acquired an almost absolute power; and, therefore, upon every slight indiscretion, he was able to influence them to join him in his revolt or disobedience. Henry considered, that the giving of his barons a power to fell their estates, which were before unalienable, must greatly weaken their interest. This liberty therefore he gave them; and it proved highly pleasing to the commons, nor was it disagreeable to the nobles themselves. His next scheme was to prevent their giving liverys to many hundreds of their dependants, who were thus kept like the soldiers of a standing army to be ready at the command of their lord. By an act passed in this reign, none but menial servants were allowed to wear livery; and this law was enforced under severe penalties.

With the clergy, Henry was not so successful. The number of criminals of all kinds who found protection in monasteries and other places appointed for religious worship, seemed to indicate little less than an absolute toleration of all kinds of vice. Henry used all his interest with the pope to get these sanctuaries abolished, but to no purpose. All that he could procure was, that if thieves, murderers, or robbers, registered as sanctuary men, should fall out and commit fresh offenses, and retreat again, in such cases they might be taken out of the sanctuary and delivered up to justice.

In 1500, the king's eldest son Arthur was married to the Infanta Catharine of Spain, which marriage had been projected and negociated seven years. But the prince dying in a few months after marriage, the princes were obliged to marry his younger brother Henry, who was created Prince of Wales in his room. Henry himself made all the opposition which a youth of 12 years of age is capable of; but as the king persisted in his resolution, the marriage was by the pope's dispensation shortly after solemnized. In the latter part of this king's reign, his economy, which had always been exact, degenerated into avarice, and he oppressed the people in a very arbitrary manner. He had two ministers, Empson and Dudley, perfectly qualified to second his arrant intentions. They were both lawyers, and usually committed to prison by indictment such persons as they intended to oppress; from whence they seldom got free but by paying heavy fines, which were called mitigations and compositions: but by degrees the very forms of law were omitted; and they determined in a summary way upon the properties of the subjects, and confiscated their effects to the royal treasury,—Henry VII. died of the gout in his fomach, in the year 1509, having lived 52 years, and reigned 23: and was succeeded by his son Henry VIII.

In Henry VII.'s reign was built the Great Harry, which cost L. 14,000. This was, properly speaking, the first ship in the English navy. Before this period, when the king wanted a fleet, he had no other expedient than to hire ships from the merchants.

Henry VIII. ascended the throne when he was about 18 years of age, and had almost every advantage which a prince can have on his accession. He had a well-flored treasury, an indisputable title, and was at peace with all the powers in Europe. Commerce and arts had been some time introduced into England, where they met with a favourable reception. The young prince himself was beautiful in his person, expert in all polite exercices, open and liberal in his air, and loved by all his subjects. The old king, who was himself a scholar, had instructed him in all the learning of the times, so that he was an adept in school-divinity before the age of 18.

All these advantages, however, seemed to have been lost upon the new king. Being destitute of a good heart and solid understanding, he proved a tyrant. Being always actuated not by reason but the passion which happened to be uppermost in his mind, he behaved in the most absurd and contradictory manner; and however fortunate some of his measures proved at first, it is impossible that either his motives, or the means he took for the accomplishment of his purposes, can be approved of by any good man.

One of Henry's first actions in his royal capacity was to punish Empson and Dudley, who were obnoxious to the populace on account of their having been the instruments of the late king's rapacity. As they could not be impeached merely on account of their having trivially executed the will of the king, they were accused of having entered into a treasonable conspiracy, and of having designed to seize by force the administration of government; and though nothing could be more improbable than such a charge, the general prejudice against them was so great, that they were both condemned and executed.

In 1510, the king entered into a league with pope Julius II. and Ferdinand king of Spain, against Louis XII. of France. In this alliance Henry was the only disinterested person. He expected nothing besides the glory which he hoped would attend his arms, and the title of Most Christian King, which the pope affured him would soon be taken from the king of France to be conferred upon him. The pope was desirous of wresting from Louis some valuable provinces which he possessed in Italy, and Ferdinand was desirous of sharing in the spoil. Henry summoned his parliament, who very readily granted him supplies, as he gave out that his design was to conquer the kingdom of France, and annex it to the crown of England.

It was in vain that one of his old prudent counsellors objected, that conquests on the continent would only drain the kingdom without enriching it; and that England, from its situation, was not fitted to enjoy extensive empire. The young king, deaf to all remonstrances, and hurried away by his military ardour, resolved immediately to begin the war. But after several attempts, which were rendered unsuccessful only by the mismanagement of those who conducted them, a peace was concluded with France on the 7th of August 1514.

Henry's arms were attended with more successes in Scotland; where King James IV. with the greatest part of the Scots nobility, and 10,000 of the common people, were cut off in the battle of Flodden*. Henry See Sur- in the mean time, puffed up with his imaginary suc-
England. 1647

The king having soon exhausted all the treasures left him by his father, as well as the supplies which he could by fair means obtain from his parliament, applied to Wolsey for new methods of replenishing his coffers. The minister's first scheme was to get a large sum from the people under the title of benevolence; though no title could be more improperly applied, as it was not granted without the greatest murmuring and complaints. Wolsey even met with opposition in the levying of it. In the first place, having exacted a considerable sum from the clergy, he next applied himself to the house of commons; but they only granted him half the sum he demanded. The minister at first was highly offended, and desired to be heard in the house; but they replied, that none could be permitted to sit and argue there except such as were members. Soon after, the king having occasion for new supplies, by Wolsey's advice attempted to procure them by his prerogative alone without consulting his parliament. He issued out commissions to all the counties of England for levying four shillings in the pound from the clergy, and three shillings and fourpence from the laity. This stretch of royal power was soon opposed by the people, and a general insurrection seemed ready to ensue. Henry endeavoured to pacify them by circular letters: in which he declared, that what he demanded was only by way of benevolence. The city of London, however, still hunted on the demand; and in some parts of the country insurrections were actually begun. These were happily suppressed by the duke of Suffolk; but the cardinal lost somewhat of the king's favour on account of the improper advice he had given him. To reinstate himself in his good graces, Wolsey made the king a present of a noble palace called York Place, at Westminster, affuring him that from the first he had intended it for the king's use. In order to have a pretence for amassing more wealth, Wolsey next undertook to found two new colleges at Oxford; and for this purpose he received every day fresh grants from the pope and the king. The former imprudently gave him liberty to suppress some monasteries, and make use of the revenues for the erection of his new colleges; but this was a fatal precedent for the pontiff's interest's as it taught the king to seize on the monastic revenues whenever he found in need of money.

For a considerable time Wolsey continued to enjoy the king's favour in an extreme degree; and as no monarch was ever more despotic than Henry VIII., no minister was ever more powerful than Wolsey. This extraordinary elevation served only to render his fall the more conspicuous, and himself the more miserable, when it took place; and what was worse, he had long foreseen, from what he knew of the king's capricious and unchangeable temper, that it certainly would happen some time or other. The cause of his final overthrow was the desire King Henry began to entertain of having his Queen Catherine divorced. The doctrine of the reformation, propagated by Luther in 1517, had gained considerable ground in England, and many professed a belief in them, notwithstanding the fierce persecution which had been carried on against heretics during some of the preceding reigns. The clergy had become so attached to this cause as to persuade the king, who was ever more powerful than Wolfey, that it was the duty of the crown to interpose in the case. The marriage was therefore put an end to, and the king, who seconded his desire, was never more powerful than Henry VIII. put him.

England. 1656

Other reasons for Henry's divorce for a love he had now contracted for Anne Boleyn, who had lately
England.

late been appointed maid of honour to the queen. In this station Henry had frequent opportunities of seeing her, and soon became deeply enamoured; and finding that his passion could not be gratified by a marriage, it is not to be doubted that he was thus obstinately set upon the divorce; for which purpose he sent his secretary to Rome to obtain from Clement a bull for dissolving his marriage with Catharine. That he might not seem to entertain any doubt of the pope's prerogative, he inflicted only on some grounds of nullity in the bull granted by his predecessor Julius for the accomplishment of the marriage. In the preamble to this bull, it had been said, that it was granted only upon the solicitation of Henry himself; though it was known that he was then a youth under 12 years of age: it was likewise asserted, that the bull was necessary for maintaining the peace between the two crowns; though otherwise it was certain that there was no appearance of a quarrel betwixt them. These false premises seemed to afford a very good pretence for dissolving it; but, as matters then stood, the pope was involved in the utmost perplexity. Queen Catharine was aunt to the emperor, who had lately made Clement himself a prisoner, and whose repentance he still dreaded: and besides, he could not with any degree of prudence declare the bull of the former pope illicit, as this would give a mortal blow to the doctrine of papal infallibility. On the other hand, Henry was his protector and friend; the dominions of England were the chief resource from whence his finances were supplied; and the King of France, some time before, had got a bull of divorce in circumstances nearly similar. In this exigence he thought the wisest method would be to split out the affair by negotiation; and in the mean time he bent over a commission to Wolsey, in conjunction with the archbishop of Canterbury or any other English prelate, to examine the validity of the king's marriage and of the former dispensation; granting them also a provisional dispensation for the king's marriage with any other person.

The pope's measure was laid before the council in England: but they considered, that an advice given by the pope in this secret manner might very easily be disfavored in public; and that a clandestine marriage would totally invalidate the legitimacy of any issue the king might have by such a match. In consequence of this, fresh messengers were dispatched to Rome, and evasive answers returned; the pope never imagining that Henry's passion would hold out during the tedious course of an ecclesiastical controversy. But in this he was mistaken. The king of England had been taught to dissemble as well as the pope, and valued himself not a little on his knowledge in theology; and to his arguments he added threats; telling him, that the English were but too well disposed to withdraw from the holy See; and that if he continued uncomplying, the whole country would readily follow the example of their monarch, who should always deny obedience to a pontiff who had treated him with such falsehood and duplicity. The king even proposed to his holiness, whether, if he were not permitted to divorce his present queen, he might not have a dispensation for having two wives at once.

The pope, perceiving the king's eagerness, at last sent Cardinal Campegio his legate to London; who, with Wolsey, opened a court for trying the legitimacy of the king's marriage with Catharine, and cited the king and queen to appear before them. The trial commenced the 31st of May 1529; and both parties preferred themselves. The king answered to his name when called: but the queen, instead of answering to hers, tore the rove from her feat, and throwing herself at the king's feet, made a very pathetic harangue; which his dignity, her virtue and misfortunes, rendered still more affecting. She told her husband, "That she was a stranger in his dominions, without protection, without counsel, and without assistance; exposed to all the injustice which her enemies were pleased to impose upon her: that she had quitted her native country, without any other resource than her connections with him and his family; and that, instead of suffering these any violence or injury, she had been affured of having in them a safeguard against every misfortune: That she had been his wife during 20 years; and would here appeal to himself, whether her affectionate submission to his will had not merited other treatment than to be thus, after so long a time, thrown from him with indignity: That she was conscious,—he himself was assured,—that her virgin honour was yet unblamed when he received her into his bed; and that her connections with his brother had been carried no farther than the mere ceremony of marriage: That their parents, the kings of England and Spain, were esteemed the wisest princes of their time, and had undoubtedly acted by the best advice when they formed the agreement for that marriage, which was now represented as so criminal and unnatural: And that the acquire as in their judgment, and would not submit her cause to be tried by a court whose dependence on her enemies was too visible ever to allow her any hopes of obtaining from them an equitable decision." Having spoken these words, the queen rose, and, making the king a low reverence, left the court; nor would she ever again appear in it. The legate having again summoned the queen to appear before them, on her refusal, declared her contemptuous, and the trial proceeded in her absence. But when the business seemed to be nearly decided, Campegio, on some very frivolous pretences, prorogued the court, and at last transferred the cause before the fee of Rome.

All this time Cardinal Wolsey seemed to be in the Embarrassed frame of the pope, and indeed much worse than of the king; as he could not boast of the fame independence which his holiness possessed. On the one hand, he was very solicitous to gratify the king his master, who had distinguished him by so many extraordinary marks of favour; on the other, he feared to offend the pope, whose servant he more immediately was, and who likewise had power to punish his disobedience. He had long known that this affair was certainly to end in his ruin; and by attempting to please all parties, he fell under the displeasure of every one; so that he was at last left without a single friend in the world. The king was displeased on account of his not entering into his cause with the warmth he thought he had reason to expect; Anne Boleyn imputed to him the disappointment of her hopes; while even queen Catharine and her friends expressed the greatest indignation against him on account of the part he had openly taken in the affair of her divorce. In this miserable situation the king
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that his subjects were entirely at his command, resolv-
defed to separate totally from the church of Rome. In the
year 1534, he was declared head of the church by par-
liament; the authority of the pope was completely
bolished in England; all his property was declared to the
church. The holy see were declared illegal; and the king was
entitled to the collation to all ecclesiastical benefices.

The nation came into the king's measures with joy,
and took an oath denominated the oath of supremacy: all
the credit which the popes had maintained over England
for ages, was now overthrown at once; and none seemed
to repine at the change, except those who were im-
mediately interested by their dependence on Rome.

But though the king thus separated from the church
of Rome, he by no means adhered to the doctrines of
Luther which had been lately published. He had
written a book against this celebrated reformer, which
the pope pretended greatly to admire; and honoured
King Henry, on his account, with the title of "Defen-
der of the faith." This character he seemed to be
determined to maintain, and therefore perfecuted the
reformers most violently. Many were burnt for deny-
ing the popish doctrines, and some also were executed
for maintaining the supremacy of the pope. The
couriers knew not which side to take, as both the new
and old religions were equally perfecuted; and as both
parties equally courted the favour of the king, he was
by that means enabled to assume an absolute authority
over the nation. As the monks had all along shown
the greatest reverence to Henry's ecclesiastical charac-
ter, he resolved at once to deprive them of the power
of injuring him. He accordingly empowered Crom-
well, secretary of state, to send commissioners into
the several counties of England to inspect the monasteries;
and to report, with rigorous exactness, the conduct
and deportment of such as were found there. This
employment was readily undertaken by some creatures
of the court, whose names were Layton, London,
Price, Gage, Pete, and Belasis. They are said to
have discovered monstrous disorders in many of the
religious houses; whole convents of women abandoned
all manner of devotion to their own lusts; the monks
complained of their envy at the king's favor; and
the friars accused the king of their crimes; pious friars every where committed, to in-
crease the devotion and liberty of the people; and
cruel and invertebrate fames maintained between the
inhabitants. Thus a general horror was excited against Suppression
these communities; and therefore the king, in 1536, of the me-
suppressed the lesser monasteries, amounting to 376 in number.

Their revenues, computed at 32,000 pounds
a-year, were confiscated to the king's use; besides their
plate and other goods, computed at 100,000 pounds
more. In 1538, the greater monasteries also were
demolished. The better to reconcile the people to this great
innovation, stories were published, perhaps with aggra-
vations, of the detestable lives which the friars led in
their convents. The relics also, and other objects of
superfluous veneration, were now brought forth, and
became objects of derision to the reformers. A
great number of these are enumerated by Protestant
writers; such as the parings of St Edmund's toes; some
of the coals that rested St Laurence; the girdle of the
Virgin Mary, shown in no fewer than eleven different
places; two or three heads of St Ursula; the felt of
St Thomas of Canterbury, an infallible cure for the
headach; part of St Thomas of Canterbury's shirt,
much revered among big-bellied women; some reliques, an excellent preservative against rain, others against weeds in corn; &c. Some impurities, however, were discovered, which displayed a little more ingenuity in the contrivance. At Staines in the county of Gloucester had been shown, during several ages, the blood of Christ brought from Jerusalem. The veneration for this precious relique may easily be imagined; but it was attended with a most remarkable circumstance not observed in any other reliques. The sacred blood was not visible to any one in mortal sin, even when near before him; nor could it be discovered till he had performed good works sufficient for his abolution. At the dissolution of the monastery, the whole contrivance was discovered. Two of the monks who were let into the secret, had taken the blood of a duck, which they renewed every week: they put it into a phial, one side of which was thin and transparent crystal, the other thick and opaque. When any rich pilgrim arrived, they were sure to show him the dark side, till maids and offerings had expiated his offences; after which they made him happy, by turning the phial.

A miraculous crucifix had been kept at Boxely in Kent, and bore the appellation of the reed of grace. The lips, eyes, and head of the image, moved on the approach of its votaries. Helyef bishop of Rochester broke the crucifix at St Paul's crofs, and showed to all the people the springs and wheels by which it had been secretly moved. A great wooden idol, called Darnel Gatherin, was also brought to London and cut in pieces; and, by a cruel refinement of vengeance, it was employed as fuel to burn Friar Forell; who was created a cardinal, on the whole, suppressed 645 monasteries, of which 28 had abbeys who enjoyed a seat in parliament. Ninety colleges were demolished in several counties; 2374 chantries and free chapels, and 110 hospitals. The whole revenue of these establishments amounted to 161,100 pounds.

It is easy to imagine the indignation which such an uninterrupted course of sacrilege and violence would occasion at Rome. In 1535, the king had executed Bishop Fisher, who was created a cardinal while in prison, and Sir Thomas More, for denying or speaking ambiguously about his supremacy. When this was reported in Italy, numerous libels were published all over the country, comparing the king of England to Nero, Domitian, Caligula, and the most wicked tyrants of antiquity. Clement VII. died about six months after he had threatened the king with a sentence of excommunication; and Paul III., who succeeded him in the Papal throne, entertained some hopes of an accommodation. But Henry was so much accustoms to domineering, that the quarrel was soon rendered totally incurable. The execution of Fisher was reckoned such a capital injury, that at last the pope passed all his cenfures against the king, citing him and all his adherents to appear in Rome within 90 days, in order to answer for their crimes. It was generally expected that they would be excommunicated for his kingdom to an interdict; declared his title by Anne Boleyn illegitimate; dissolved all leagues which any Catholic princes had made with him; gave his kingdom to any invader; commanded the nobility to take up arms against him; freed his subjects from all oaths of allegiance; cut off their commerce with foreign states; and declared it lawful for any one to seize them, to make slaves of their persons, and to convert their effects to his own use. But though these censures were then passing, they were not openly denounced. The pope delayed the publication till he should find an agreement with England totally desperate, and till the emperor, who was then hard pressed by the Turks and the Protestant princes of Germany, should be in a condition to carry the sentence into execution. But in 1538, when news arrived at Rome that Henry had proceeded with the monasteries as above related, the pope was at last provoked to publish the censures against him. Libels were again dispersed, in which he was anew compared to the most furious persecutors of antiquity, and the preference was now given on their side. Henry, it was said, had declared war with the dead, whom the Pagans themselves respected; was at open enmity with heaven; and had engaged in professed hostility with all the saints and angels. Above all, he was reproached with his resemblance to the emperor Julian, whom (it was said) he imitated in his Apostasy and learning, though he fell short of him in his morals. But these terrible fulminations had now lost their effect. Henry had long ago denied the supremacy of the Pope, and therefore had appealed from him to a general council; but now, when a general council was summoned at Mantua, he refused to be subject to it, because it was called by the pope, and lay entirely under subjection to that spiritual usher. He engaged his clergy to make a declaration to the like purpose, and preferred to them many other alterations with regard to their ancient tenets and practices. It was expected that the spirit of opposition to the church of Rome would have at last made him fall in with the doctrines of the reformed; but though he had been gradually changing the theological system in which he was educated; ever since he came to the years of maturity, he was equally positive and dogmatical in the few articles he retained, as tho' the whole fabric had continued entire and unshaken: and though he stood alone in his opinion, the flutter of courtiers had so much inflamed his tyrannical arrogance, that he thought himself entitled to regulate by his own particular standard, the religious faith of the whole nation. The point on which he chiefly relied his orthodoxy was the most absurd in the whole Popish doctrine, namely, that of transubstantiation. All departure from this he held to be a damnable error; and nothing, he thought, could be more honourable for him, than, while he broke off all connections with the Roman pontiff, to maintain, in this essential article, the purity of the Catholic faith.

In 1539, a parliament was called, which met on the 28th day of April. The chancellor opened this
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The parliament by informing the House of Lords, that it was his majesty's earnest desire to extirpate from his kingdom all diversity of opinions with regard to religion; and as this enterprise was, he owned, difficult and dangerous, he desired them to choose a committee from among themselves, who might frame certain articles, and communicate them afterwards to parliament. The lords named the vicer-general Cromwell, now created a peer, the archbishops of Canterbury and York, the bishops of Durham, Carlisle, Worcester, Bath and Wells, Bangor and Ely. This small committee itself was agitated with such diversity of opinions, that it could not come to no conclusion. The Duke of Norfolk then moved, that since there was no hope of having a report from the committee, the articles of faith proposed to be established should be reduced to a fix, and a new committee be appointed to frame an act with regard to them. As this peer was underfoot to speak the king's mind, his motion was immediately complied with; and after a short prorogation, the bill of the fix articles, or the bloody bill, as the Protestants justly termed it, was introduced: and having passed the two houses, received the king's assent. By this law the doctrine of the real presence was established; the communion in one kind; the perpetual obligation of vows of chastity; the utility of private masses, and the celibacy of the clergy; and the necessity of auricular confession. The denial of the real presence subjected the person to death by fire, and to the same forfeiture as in cases of treason; and admitted not the privilege of abjuring: an unheard-of cruelty, unknown even to the inquisition itself. The denial of any of the other articles, even though recanted, was punishable by the forfeiture of goods and chattels, and imprisonment during the king's pleasure: an obstinate adherence to error, or a relapse, was adjudged to be felony, and punishable by death. The marriage of priests was subjected to the same punishment. Their commerce with women, was, for the first offence, forfeiture and imprisonment: and for the second, death. Abating from confession, and from receiving the eucharist at the accustomed times, subjected the person to fine, and to imprisonment during the king's pleasure; and if the crime were concerted after confession, he was punishable by death and forfeiture, as in cases of felony. Commissioners were to be appointed by the king for enquiring into these heresies and irregular practices, and the criminals were to be tried by a jury. The parliament having thus surrendered their ecclesiastical privileges, next proceeded to surrender their civil ones also. They gave to the king's proclamations the same force as to statutes enacted by parliament, and thus by one blow made a total subversion of the English constitution; and to render the matter worse, if possible, they framed this law as if it were only declaratory, and intended to explain the natural extent of the royal authority.—Notwithstanding this, however, they afterwards pretended to make some limitations in the regal power; and they enacted, that no proclamation should deprive any person of his lawful possessions, liberties, inheritances, &c. nor yet infringe any common law or laudable custom of the realm.

As soon as the act of the six articles had passed, the Catholics were extremely vigilant to inform against offenders; and, in a short time, no fewer than 500 persons were thrown into prison. But some of the chief officers of state remonstrating against the cruelty of punishing such a number of delinquents, they were all sent for; they sat at liberty; and soon after this, Henry, as if he had resolved to give every party the advantage by turns, granted every one permission to have a translation of the Bible, which had been newly made, in his family.

In 1540, the king again complained to parliament of the great diversity of religious tenets which prevailed among his subjects; a grievance, he affirmed, which ought the less to be endured, because the scriptures were now published in England, and ought universally to be the standard of belief to mankind. But he had appointed, he said, some bishops and divines to draw up a list of tenets; and he was determined that Christ and the truth should have the victory; whereas he seems to have expected more from this new book of his doctors, than had ensued from the publication of the scriptures. Cromwel, as vicar-general, also made a speech in the upper house; and the peers in return told him, that he deferred to be vicar-general to the universe: To such a degree of mean and servile submissiveness was the English parliament at this time reduced.

This year also the king suppressed the only religious Suppression order remaining in England; namely, the knights of the St John of Jerusalem, or the knights of Malta, as they are commonly called. This order had by their valor done great service to Christendom; and had very much retarded, at Jerusalem, Rhodes, and Malta, the rapid progress of the barbarians. During the general surrender of the religious houses in England, they had obstinately refused to give up their revenues to the king; and Henry, who would endure no society that professed obedience to the pope, was obliged to have recourse to parliament for the dissolution of this order. Their revenues were large, and formed a considerable addition to the acquisitions which the king had already made. But he had been such a bad economist, that, notwithstanding the immense plunder afforded him by the church, he now demanded from parliament a very considerable supply: The commons, though lavish of the blood of their fellow-subjects, were extremely frugal of their money; and it was not with, out murmuring that the grant could be obtained, even by this absolute and dreaded monarch.

The king all this time continued to punish with unrelenting severity the Protestants who offended against the law of the six articles, and the Papists who denied his supremacy; which gave occasion to a foreigner at that time to say, that those who were against the Pope were burned, and those who were for him were hanged. The king even deemed it fit to display in an ostentatious manner his tyrannical justice and impartiality which reduced both parties to subjection. This year he executed three Protestants and three Papists coupled together. The latter declared, that the most grievous part of their punishment was the being coupled to such heretical miscreants as suffered with them.

In 1542, Henry proceeded to the further dissolution of colleges, hospitals, and other foundations of any colleges, that nature. The courtiers had been dealing with the hospitals, prelates and governors to make a surrender of their revenues.
England. revenues to the king; and they had succeeded with eight. But there was an obstacle to their further pro-
gress; it had been provided by the local statutes of most of those foundations, that no president nor any fellows could make such a deed without the unanimous consent of all the fellows. This contest would not have been easily obtained; but the parliament proceeded in a summary manner to annul all these statutes; by which means the revenues of those houses were exposed to the rapacity of the king and his favourites. Henry also now extorted from many bishops a surrender of their chapter-lands; by which means he pillaged and enriched his favourites with their spoils. He engaged the parliament to mitigate the penalties of the six articles, as far as regarded the marriage of priests which was only now subjected to a forfeiture of goods, chattels, and lands during life: he was still equally bent on maintaining a rigid parity in speculative principles. He had appointed a commission confining two archbishops and several bishops of both provinces, together with a considerable number of doctors of divinity; and by virtue of his ecclesiastical supremacy he had charged them to choose a religion for his people. Before the commissioners, however, had made any progress in this arduous undertaking, the parliament had palette a law by which they ratified all the tenets which these divines should establish with the king's consent; and thus they were no less ashamed of declaring expressely that they took their religion upon trust, and had no other rule either in religious or temporal concerns than the arbitrary will of their master. One clause of the statute, however, seems to favour somewhat of the spirit of liberty. It was enacted, that the ecclesiastical commissioners should establish nothing repugnant to the laws and statutes of the realm. But in reality this proviso was inferted by the king, to serve his own purposes. By introducing a confusion and contradiction into the laws, he became more the master of every one's life and property; and as the ancient independence of the church fell gave him jealousy, he was well pleased, under colour of such a clause, to introduce appeals from spiritual to civil courts. For the same reason he would never promulgate a body of canon law; and he encouraged the judges on all occasions to entere into ecclesiastical causes, wherever they thought the law or the prerogative concerned. Being thus armed by authority of parliament, or rather by their acknowledgement of his spiritual supremacy, the king employed his commissioners to select a system of tenets for the affine and belief of the nation. A small volume was published under the title of The Institution of a Christian Man, which was received by the convocation, and made the infallible standard of orthodoxy. In this book the points of justification, faith, free-will, good works, and grace, were discussed in a manner somewhat favourable to the opinions of the reformers. The sacraments, which a few years before were only allowed to be three, were now increased to seven, conformably to the sentiments of the Catholics. Throughout the whole of this book the king's caprice is very discernible; and the book is in reality to be regarded as his composition. For Henry, while he made his opinion a rule for the nation, would himself submit to no authority whatever; not even to any which he had formerly established. The same year the people had a further instance of the king's infidelity. He ordered a new book to be composed, called The Erudition of a Christian Man; and with it out asking the consent of the convocation, he published by his own authority this new model of orthodoxy. He was no less positive in his new creed than he had been in the old one; but though he required the faith of the nation to veer about at his signal, he was particularly careful to circulate the doctrine of passive obedience in all his books, and he was no less careful to retain the nation in the practice.

But while the king was thus spreading his own books among the people, both he and the clergy seem to have been very much perplexed with regard to the scriptures. A review had been made by the ecclesiastical synod of the new translation of the Bible; and Bishop Gardiner had proposed, that instead of employing English expressions throughout, several Latin words should still be preferred, because they contained, as he pretended, such peculiar energy and significance, that they had no correspondent terms in the English tongue. Among these were ecclesiae, penitentia, potestas, contritus, &c. But as this mixture would appear extremely barbarous, and was plainly calculated for no other purpose than to retain the people in their ancient ignorance, the proposal was rejected. The knowledge of the people, however, seemed to be still more dangerous than their ignorance; and the king and parliament, soon after the publication of the scriptures, retracted the concession which they had formerly made, and prohibited all but gentlemen and merchants to peruse them. Even that liberty was not granted without an apparent hesitation, and dread of the consequences. These persons were allowed to read, "so it be done quietly and with good order." And the preamble to the act sets forth, "That many seditions and ignorant persons had abused the liberty granted them of reading the Bible; and that great diversity of opinion, animosities, tumults, and schisms, had been occasioned by perverting the sense of the scriptures." The mass-book also passed under the king's examination; but little alteration was yet made in it. Some doubtful or fictitious points only were struck out; and the name of the pope was erased. The latter precaution was also used with every new book that was printed, and even every old one that was sold. The word pope was carefully omitted or blotted out; as if that precaution could abolish the term from the language, or cause the people forget that such a person existed. About this time also, the king prohibited the acting of plays, interludes, and farces, in derision of the Popish superstitions; which the Protestants had been in use to ridicule; and this prohibition was in the highest degree pleasing to the Roman Catholics.

In this tyrannical and headstrong manner Henry proceeded with regard to ecclesiastical affairs. In other respects his conduct was equally violent. With regard to his domestic concerns, history scarce affords his parallel. We have already taken notice of his extreme love for Anne Boleyn, whom he married, contrary even to his own principles, before the marriage with Catharine was dissolved. His affection for the former was carried to such an height, that he even procured an act excluding from the succession the life of Queen Catharine, in favour of the children of
The Execution of Anne Boleyn.

In England.

Anne Boleyn; and failing them to the king's heirs for ever. An oath to this purpose was likewise enjoined, under penalty of imprisonment during the king's pleasure, and forfeiture of goods and chattels. All slander against the king and his new queen or their issue, was subjected to the penalty of treason or misprision of treason. The reason given for this extreme severity towards his own child, was that her mother had obstinately refused to quit the kingdom, notwithstanding all the methods he could take to induce her to do so. The oath was generally taken throughout the kingdom; Sir Thomas More the chancellor, and Fisher bishop of Rochester, being the only persons who refused; for which both of them were imprisoned, and soon after executed. The unfortunate queen Catherine died, in her retreat at Amphi-

thill, in the year 1530. On her death-bed she wrote a most pathetic letter to the king, in which she for-gave him all the injuries she had received, and recommen-ded to him in the strongest terms their daughter the prince's Mary. This letter affected Henry so much, that he could not read it without tears; but the new queen is said to have exulted in such a manner on hearing of the death of her rival, as was quite inconsequent with either decency or humanity. Her triumph, however, was of short duration. Henry had no sooner proffered her, secure from every disquieting thought by the death of queen Catherine, than his passion began to decline; and to this her delivery of a dead child was a little confluence; for so injured and abjured were his passions, and such was his desir-e for male issue, that the disappointment in this respect alone was sufficient to alienate his affection from her wife. The levity of her temper, and her extreme gaiety of behaviour bordering upon licentiousness, as related under the article BOLEYN, also gave an opportunity to her enemies of emflaying the king's jealousy against her. The vicountess of Rocheford, in particular, a woman of profligate manners, and who was married to the queen's brother, had the cruelty to report to the king that her husband committed incest with her sister; and not content with this, she interpreted every insinuation of favour shown by him to a man, as a proof of a criminal intercourse between them. At the same time it must not be forgot, that he who insisted on such rigid fidelity from his wives, was himself the most faithless of mankind. He had doubts, it may be allowed, about the legality of his marriage with Queen Catherine, but his doubts were evidently confirmed by the charms of Anne Boleyn. After being fattiated with the possession of her for six years, perhaps he really doubted her fidelity; but here again his doubts were confirmed by the beauty of Jane Seymour, with whom he now fallen in love. It may cally be believed, that from this consideration alone there was no reason to hope that ever the unfortunate Anne would be able to extricate herself. Had she really been guilty, her monster of a husband might have allowed her to live; but his cruelty was as unbounded and insatiable as his other perver-sive passions. She was condemned; and the sentence pronounced against her was, that she should be burned or beheaded at the king's pleasure. On hearing this dreadful denunciation, she exclaimed, "O Father! O Creator! thou who art the way, the truth, and the life! thou knowest that I have not deferred this fate." She then made the most solemn protestations of innocence before her judges; but these, as they had been from the beginning inefficacious, so it was not to be supposed that they could now avail any thing. Anne was beheaded by the executioner of Calais, who was reckoned more expert than any in England; and Hen-

ry enjoyed the pleasure of marrying his beloved Jane third marriage of Henry. His satisfaction, however, was of no long-continued: for the queen, becoming pregnant immediately after marriage, died in two days after the birth of the child; who being a son, was baptized by the name of Edward VI. As this lady had been more be-holden by Henry than any of his other wives, his grief for the loss of her was extreme. However, it did not hinder him from entering very soon afterwards into a new matrimonial scheme; in which he met with many difficulties. His first proposals were made to the duchess dowager of Milan, niece to the em-peror and to Catherine his own former queen; but as he had behaved so indifferently to the aunt, it is scarce to be supposd that his addresses could prove agreeable to the niece. On this he demanded the duchess dowager of Longueville, daughter of the duke of Guise; but on making the proposal to the French monarch, Francis I. he was informed that the princefs had been already betrothed to the king of Scotland. Henry, however, would take no refusal. He had learned that the object of his affection was endowed with many accomplishments, was very beautiful, and of a character not a little amiable; in short, he was drawn upon to be necessary for him who was now become somewhat cupulent himself. Francis, to prevent any more solicitation on this subject, sent the princes to Scotland, but at the same time made Hen-

ry an offer of Mary of Bourbon, daughter of the Duke of Vendome. This princes was rejected by Henry, because he had heard of her being formerly refuted by the king of Scotland. He was then offered his choice of the two younger sisters of the queen of Scotland, both of them being equal in merit as well as size to the one whom he had desired; but Henry, unwilling to tryst to any reports concerning the beauty of these ladies, or even to their pictures, proposed to Francis, that they should have a conference at Calais under pretence of business, and that the latter should bring with him the two princes of Guise with the finest ladies of quality in France, that he might make a choice. This indecisive proposal shocked Francis; he returned for answer, that he was too much impressed with regard for the fair-sex to carry ladies of the first quality, like geldings, to a market, to be choses or rejected according to the humour of the purchaser. Henry remonstrated and flormed as usual; but though Francis at this time earnestly wished to oblige him, he at last totally rejected the proposal. Negotiations were then entered into for a German match; and the prin-

ces of Cleves was proposed by Cromwell, on account of the great interest her father had with the Protestant princes of Germany. Henry had also become enamoured of her perfon from a picture of her he had seen: but this, tho' drawn by an eminent artist, was unluckily done so much to the advantage, that when the negociation was quite finished, and the bride arrived in England, he left all patience, swearing that the was a great Flanders mare, and that he could never bear her the smallest affection. The matter was still worse, when he found that the

Could,
could speak no language but Dutch, of which he was entirely ignorant. Notwithstanding all these objections, however, he resolved to complete the marriage, telling Cromwell, that since he had gone so far, he must now put his neck into the yoke. The reason of this was, that the friendship of the German princes was now more than ever necessary for Henry; and it was supposed that the affront of sending the princes back to her own country might be retented. Cromwell, who knew that his own life depended on the event of the matter, was very anxious to learn from the king how he liked his spousal after having passed a night with her; but was stuck with terror when he replied that he now hated her more than ever; that he was resolved not to cohabit with her, and even suspected that she was not a virgin; a matter in which he pretended to be a conniver, and about which he was extremely scrupulous. In a little time his aver- tion increased to such a degree, that he determined at any rate to get rid of his queen and prime minister both at once. Cromwell had long been an object of averton to the nobility, who hated him on account of his obscure birth; his father being no other than a blacksmith, though the son had obtained the first employments in the kingdom. By his office of vicar-general, he had an almost absolute authority over the clergy; he was also lord privity-seal, lord chamberlain, and master of the wards. He had also been invested with the order of the garter, and was created earl of Effex. This was sufficient to raise the envy of the courtiers: but he had also the misfortune to fall under the displeasure of both Protestants and Papists; the former hating him on account of his concurrence with Henry in their persecution, and the latter looking upon him as the greatest enemy of their religion. To these unfortunate circumstances on the part of Cromwell, was added the usual situation of Henry himself, who had now fallen in love with Catharine Howard, niece to the duke of Norfolk; to enjoy whom, he now determined to divorce Anne of Cleves. By the intimations of this lady and her uncle, Cromwell's ruin was accomplished; and he was condemned, not only without any trial, but even without examination. The charge was of heresy and high treason; but the influences of the latter were quite absurd and ridiculous. He submitted, however, to his sentence without murmuring, as knowing that his complaints on this subject would be revenged on his son. He was terribly mangled by the executioner before his head could be struck off. His death was soon followed by the dissolution of the marriage with the princes of Cleves, which was annulled by the consent of both parties. The princes parted from him with great indifferency; and accepted of L.3000 a-year as a compensation, but refused to return to her own country after the affront the king had received.

The king's marriage with Catharine Howard foop followed the dissolution of that with Anne of Cleves; but the event may surely be regarded as a providential punishment upon this tyrant, whose cruelty, lust, and other bad qualities, can scarcely be matched in history. We have already mentioned his infinuations against the virtue of the unfortunate princes of Cleves, were amply repaid by the actual infidelities of his new queen, whom we must suppose he believed to be a pure and England perfect virgin at the time he married her. So happy indeed did he imagine himself in this new marriage, that he publicly returned thanks for his conjugal felicity, when a most unfortunate information concerning the queen's incontinence was given to Cranmer by one of the name of Lafeelles, whose sifter had been servant to the duchess dowager of Norfolk. He not only gave intelligence of her amours before marriage, but affirmed that she had continued the same criminal practices ever since. Two of her paramours were arrested, and confessed their crimes: the queen herself also confessed guilt before marriage, but denied having ever been false to the king's bed; which, however, had very little probability. She was beheaded on Tower-hill, along with the vicountesses of Rochford, who had been a confident in her amours. The latter, as has already been observed, was a principal instrument in procuring the destruction of the unhappy Anne Boleyn, and therefore disinclined; while the virtuous character of that unfortunate lady received an additional confirmation from the discovery of this woman's guilt.

Thenceforward could carry no further disasters of Abhurdity from this kind, Henry passed a most extraordinary law, of the king, enacting that any one who should know, or strongly suspect any guilt in the queen, might, within 20 days, disclose it to the king or council, without incurring the penalty of any former law against defaming the queen; though at the same time every one was prohibited from spreading the matter abroad, or even privately whispering it to others. It was also enacted, that if the king married any woman who had been incontinent, taking her for a true maid, she should be guilty of treason if she did not previously reveal her guilt to him.

These laws afforded diversion to the people, who now said that the king must look out for a widow; as no reputed maid would ever be persuaded to incur the penalty of the statute. This in truth happened to be as the case was; for about a year after the death of Catharine Howard, he married for his sixth wife, Catharine Parr, widow of Nevil Lord Latimer. This lady, being somewhat inclined to the doctrines of the reformation, and having the boldness to tell her husband her mind upon the subject, had like to have shared the fate of the reft. This furious monarch, incapable of bearing the least contradiction, instantly.com bailed to bishop Gardiner, who inflamed the quarrel as much as possible; so that at last the King confessed that articles of impeachment should be drawn up against her. But these were rendered abortive by the prudence and address of the queen, as related under the article PARR.

All this time Henry had tyrannized over his nobility in the most cruel manner. The old countess of Salisbury, the last of the house of Plantagenet, was executed with circumstances of great cruelty. She had been condemned, as usual, without any trial; and when she was brought to the scaffold, refused to lay her head on the block in obedience to a sentence, to the justice of which she had never consented. She told the executioner, therefore, that if he would have her head, he must win it the best way he could; and thus she ran about the scaffold, purified by the executioner,

The marriage annuller and Cromwell put to death.

Henry falls in love with Catherine Howard.

Infidelity and death of the new queen.
tioner, who aimed many fruitless blows at her neck before he was able to put an end to her life. Soon after her, the Lord Leonard Grey was likewise executed for treason, but we have very little account of this transaction.

The last instances of the king's injustice and cruelty were the duke of Norfolk, and his son the earl of Surry. The former had served the king with fidelity, and the latter was a young man of the most promising hopes. His qualifications, however, were no security against the violence of Henry's temper. He had dropped some expressions of resentment against the king's ministers, who had displaced him from the government of Boulogne; and the whole family had become obnoxious on account of the late Queen Catharine Howard. From these motives, orders were given to arrest both the father and son; and accordingly they were arrested both on the same day, and confined to the Tower. The duke's-dowager of Richmond, Surry's own sister, was among the number of his accusers; and Sir Richard Southwell also, his most intimate friend charged him with infidelity to the king. Surry denied the charge, and challenged his accuser to a single combat. This favour was denied him; and, notwithstanding his eloquent and spirited defence, he was condemned and executed at Tower-hill. --The duke of Norfolk was involved in the same conspiracy, and was also condemned and executed. An attainder was found against him, though the only crime his accusers could allege was, that he had once said that the king was sickly, and could not hold out long; and that the kingdom was likely to be torn between the contending parties of different persuasions. Cranmer, though engaged for many years in an opposite party to that of Norfolk, and though he had received many and great injuries from him, would have no hand in such an unjust prosecution; but retired to his seat at Croydon. The death-warrant, however, was made out, and immediately sent to the Lieutenant of the Tower; but a period was put to the cruelties and violence of the king by his death, which happened on the 14th of January 1547, the night before Norfolk was to have been executed.

Henry was succeeded by his only son Edward, a boy of nine years of age. The most remarkable transactions of his reign are those with regard to religion. The reformation which Henry VIII. had laid upon the Protestants was now taken off; and they not only maintained their doctrines openly, but soon became the prevailing party. Henry had fixed the majority of his son at 18 years of age; and in the mean time, appointed 16 executors of his will, to whom, during the minority, he entrusted the government of the king and kingdom. This will, he imagined would be obeyed as implicitly after his death as though he had been alive. But the first act of the executors was to choose the Earl of Hertford, afterwards duke of Somerset, protector of the realm; and in him was lodged all the regal power, together with a privilege of naming whom he pleased for his privy council.

The duke of Somerset had long been reckoned a secret partisan of the reformers; and, immediately on his elevation to his present high dignity, began to express his intention of reforming the abuses of the ancient religion. Under his direction and that of Cranmer, therefore, the reformation was carried forward and completed. The only person of consequence who opposed the reformers was Gardiner bishop of Winchester; and, to the disgrace of their own principles, the reformers now showed that they could persecute as severely as the papists had formerly persecuted them. Gardiner was committed to the Fleet prison, where he was treated with great severity. He was afterwards sent to the Tower; and having continued there two years, he was commanded to subscribe several articles, among which was one confounding the justice of his own imprisonment. To all the articles but this he agreed to subscribe; but that did not give satisfaction. He was then committed to close custody; his books and papers were seized; all company was denied him, and he was not even permitted the use of pen and ink. The bishops of Chichester, Worcester, and Exeter, were in like manner deprived of their offices; but the bishops of Landaff, Salisbury, and Coventry, escaped by pacifying the most considerable share of their revenues. The libraries of Westminster and Oxford were ordered to be ransacked, and purged of the Romish legends, missals, and other superstitious volumes; in which search, great devastation was made even in useful literature. Many volumes clasped in silver were destroyed for the sake of their rich bindings; many of geometry and astronomy were supposed to be magical, and destroyed on that account; while the members of the university, unable to put a stop to these ravages, trembled for their own safety.

The reformers, however, were not contented with severities of this kind. A commissary was granted to the primate and others, to search after all Anabaptists, heretics, or contemners of the new liturgy. Among the numbers who were found guilty upon this occasion, was one Joan Boucher, commonly called Joan of Kent; who was so very obstinate, that the commissioners could make no impression upon her. She maintained an abstruse metaphysical sentiment, that Christ, as man, was a sinful man; but as the Word, he was free from sin, and could be subject to none of the frailties of the flesh with which he was clothed. For maintaining this doctrine, the poor woman was condemned to be burnt to death as an heretic. The young king, who it seems had more sense than his teachers, refused at first to sign the death-warrant: but at last, being overcome by the importunities of Cranmer, he reluctantly complied; declaring, that if he did wrong, the sin should be on the head of those who had persuaded him to it. The primate, after making another unsuccessful effort to reclaim the woman from her opinions, committed her to the flames. Some time after, one Van Paris, a Dutchman was condemned to death for Ari­stianism. He suffered with so much satisfaction, that he hugged and cursed the faggots that were consuming him.

The rest of this reign affords only the history of intrigues and cabals of the courtiers one against another. The protector was first opposed by his own brother admiral Sir Thomas Seymour, who had married Catharine Parr the late king's widow. She died soon after the marriage; and he then made his addresses to the Princess Elizabeth, who is said not to have been averse to the match. His brother, the duke, who was at that time in the north, being informed of
Sir Edward Deane, his ambitious projects, speedily returned, had him attained of high treason, and at first condemned and executed. The duke of Somerset himself, however, was some time afterwards deprived of his office by Dudley duke of Northumberland; who at last found means to get him accused of high treason, and executed. Not satisfied with the office of protector, which be affirmed on the death of Somerset, this ambitious nobleman formed a scheme of engrossing the sovereign power altogether. He represented to Edward, who was now in a declining state of health, that his sisters Mary and Elizabeth, who were appointed by Henry's will to succeed, in failure of direct heirs to the crown, had both been declared illegitimate by parliament; that the queen of Scots his aunt, stood excluded by the king's will; and, being an alien also, lost all right of succeeding. The three princesses being thus excluded, the succession naturally devolved to the marchioness of Dorset eldest daughter of the French queen, Henry's sister, who had married the earl of Suffolk after her first husband's death. The next heir to the marchioness was Lady Jane Gray, a lady universally respected, both on account of the charms of her person, and the virtues and endowments of her mind. The king, who was accustomd to submit to the politic views of this minister, agreed to have the succession submitted to council, where Northumberland hoped to procure an easy concurrence. The judges, however, who were appointed to draw up the king's letters patent for this purpose, warmly objected to the measure; and gave their reasons before the council. They begged that a parliament might be summoned, both to give it force, and to free its partisans from danger: they said that the form was invalid, and would not only subject the judges who drew it, but every counsellor who signed it, to the pains of treason. Northumberland could not brook their demurs; he threatened them with his authority, called one of them a traitor, and said he would fight with any man in his shirt in such a just cause as that of Lady Jane's succession. A method was therefore found out of screening the judges from danger, by granting them the king's pardon for what they should draw up; and at length the patent for changing the succession was confirmed, the princesses Mary and Elizabeth were set aside, and the crown settled on the heirs of the duchess of Suffolk (for she herself was contented to forego her claim.)

For some time the king had languished in a consumption. After this settlement of the crown, his health visibly declined every day, and little hopes were entertained of his recovery. To make matters worse, his physicians were dismissed by Northumberland's advice, and by an order of council; and he was put into the hands of an ignorant old woman, who undertook in a little time to restore him to health. After the use of her medicines all his bad symptoms increased to the most violent degree. He felt a difficulty of speech and breathing; his pulse failed, his legs swelled, his colour became livid, and many other signs of approaching death made their appearance. He expired at Greenwich on the 6th of July 1553, in the 60th year of his age and 7th of his reign.

After the death of King Edward, very little regard was paid to the new patent by which Lady Jane Gray had been declared heir to the throne. The undoubted title of Mary, notwithstanding the scandalous behaviour of her father and his servile parliaments, was acknowledged by the whole nation. Northumberland, however, was resolved to put the late king's will in execution. He therefore carefully concealed the death of Edward, in hopes of securing the person of Mary, who by an order of council had been required to attend her brother during his illness; but the being informed of his death, immediately prepared to offer her right to the crown. Northumberland then, accompanied by the duke of Suffolk, the earl of Pembroke, and some other noblemen, saluted Lady Jane Gray queen of England. Jane was in a great measure ignorant of these transactions, and it was with the utmost difficulty she was persuaded to accept of the dignity conferred upon her. At last she complied, and suffered herself to be conveyed to the tower, where it was then usual for the sovereigns of England to pass some days after their accession. Mary, however, who had retired to Kenning-hall in Norfolk, in a very few days found herself at the head of 40,000 men; and Lady Jane resigned the sovereignty in ten days, with much more pleasure than she had received it. She retired with her mother to their own habitation; and Northumberland finding his affairs quite desperate, attempted to quit the kingdom. But he was stopped by the band of pensioners, who informed him that he must stay to justify their conduct in taking arms against their lawful sovereign. He therefore surrendered himself to Mary; and was soon after executed, together with Sir John Cates and Sir Thomas Palmer, two infamous tools of his power. Sentence was also pronounced against Lady Jane Gray and her husband Lord Guildford; but without any intention of putting it in execution against them at present, as their youth and innocencé pleaded so strongly in their favour, neither of them having yet reached their 17th year.

Mary now entered London, and was peaceably set on the throne without any effusion of blood. The English, however, soon found reason to repent their attachment to her cause. Though she had at first solemnly promised to defend the religion and laws of her predecessor, she failed to keep her self firmly established on the throne, than she resolved to restore the Popish religion, and gave back their former power to the clergy. Gardiner, Bonner, and the other bishops who had been imprisoned or suffered lods during the last reign, were taken from prison, reinstated in their seats, and now triumphed in their turn. On pretence of discouraging controversy, the queen by her prerogative silenced all preachers throughout England, except such as should obtain a particular licence, and this she was resolved to give only to those of her own persuasion. The greater part of the foreign Protestants took the first opportunity of leaving the kingdom; and many of the arts and manufactures, which they had successfully introduced, fled with them. Soon after, the queen called a parliament, which seemed willing to concur in all her measures. They at once repealed all the statutes with regard to religion that had passed during the reign of Edward VI. and the national religion was again placed on the same footing in which it had been the death of Henry VIII.
the queen more power to establish the religion to which she was so much attached, a proper match was to be sought for her; and it was supposed that three had already been proposed as candidates for her favour: Her affection seemed to be engaged by the earl of Devonshire; but as he was rather attached to the Princess Elizabeth, she received the overtures which were made from the queen with neglect. The next person mentioned as a proper match for her was Cardinal Pole, a man greatly respected for his virtues; but as he was now in the decline of life, Mary soon dropped all thoughts of that alliance. At last she cast her eye on Philip II. of Spain, son to the Emperor Charles V. - He was then in the 27th year of his age, and consequently agreeable in that respect to Mary, who was in her 48th year; but when her intentions with regard to this match became known, the greatest alarm took place throughout the whole nation. The commons presented such a strong remonstrance against a foreign alliance, that the queen thought proper to dissolve the parliament in order to get quit of their importunity. To obviate, however, all consequences of the articles of marriage were drawn up as favourably as possible for the interests of England. It was agreed, that though Philip should have the title of king, the administration should be entirely in the queen; that no foreigner should be capable of holding any office in the kingdom; nor should any innovation be made in the laws, customs, and privileges of the people; that Philip should not carry the queen abroad without her consent, or any of her children without the consent of the nobility. Sixty thousand pounds a year were to be settled upon her as a jointure; and the male issue of this marriage was to inherit Burgundy and the Low Countries as well as the crown of England; and in the ease of the death of Don Carlos, Philip's son by his former marriage, without any heir, the queen's issue should inherit all the rest of the Spanish dominions also.

All these concessions, however, were not sufficient to quiet the apprehensions of the people: they were considered merely as words of course, which might be retracted at pleasure; and the whole nation murmured loudly against a transference so dangerous to its ancient liberty and independence. An insurrection was raised by Sir Thomas Wyatt, a Roman Catholic, at the head of 10,000 men, who, on the 10th of July, published a declaration against the Spanish match and the queen's evil councilors. Having advanced as far as Southwark, he required that the queen should put the Tower of London into his hands; that she should deliver four counsellors as hostages; and, in order to ensure the liberty of the nation, should marry an Englishman. But his force was at present by far too small to support such magnificent pretensions; and he unluckily waited so much time without attempting any thing of importance that the popular ferment entirely subsided, his followers abandoned him gradually, and he was at last obliged to surrender himself to Sir Maurice Berkeley near Temple-bar. His followers were treated with great cruelty, no fewer than 400 of them suffering by the hand of the executioner; 40 more were conducted with ropes about their necks into the queen's presence, and there received their pardon. Wyatt himself was condemned and executed.

This rebellion had almost proved fatal to the Princess Elizabeth, who for some time past had been treated with great severity by her sister. Mary, who possessed a most malignant and cruel heart, had never forgotten the quarrel between their mothers; and when a declaration was made after her own accession, recognizing Queen Catharine's marriage as legal, she was thus furnished with a pretence for accounting Elizabeth illegitimate. She was likewise obnoxious on account of her religion, which Elizabeth at first had not prudence sufficient to conceal; though afterwards she learned full well to disguise her sentiments. But above all, her standing so high in the affection of the Earl of Devonshire, was a crime not to be forgiven; and Mary made her sensible of her displeasure by numberless mortifications. She was ordered to take place at court after the Dutchess of Suffolk and the Countess of Lennox; to avoid which, and other indignities, Elizabeth at last retired from court to Woodstock. After the suppression of Wyatt's rebellion she was committed to the tower, and underwent a strict examination before the council; but as Wyatt had made a declaration on the scaffold that she was in no manner of way concerned, the queen found herself under a necessity of releasing her. To get rid of such a troublesome rival, however, she was offered in marriage to the Duke of Savoy; and on Elizabeth's declining the proposal, she was committed close prisoner to Woodstock. The rebellion proved fatal, however, to many persons of distinction, and gave the queen an opportunity of manifesting that unbounded cruelty which reigned in her heart. The Tower, and all the prisons in the kingdom, were filled with nobility and gentry, who became objects of royal vengeance, more on account of their credit and interest with the people than any concern they were supposed to have had with Wyatt. Sir Nicholas Throgmorton was tried in Guildhall; but as no satisfactory evidence appeared against him, the jury gave a verdict in his favour. The queen was so much enraged at this disappointment, that she re-committed him to the Tower, summomed the jury before the council, and at last sent them all to prison, finding them afterwards some of 1000 l. and others of 2000 l. each. Sir John Throgmorton, brother to Sir Nicholas just mentioned, was committed to London, and committed upon evidence which had been already rejected as insufficient. But of all those who perished on this occasion, none excited more universal compassion than the unfortunate Lady Jane Grey and her husband Lord Guildford Dudley. They had already received sentence of death, as has been mentioned; and two days after the execution of Wyatt, they received orders to prepare for eternity. Lady Jane, who had been in expectation of this blow, was no ways intimidated, but received the news with the most heroic resolution. The place intended at first for their execution was Tower-hill; but the council, dreading the effects of the people's compassion for their youth, beauty, and innocence, gave direction that they should be beheaded within the verge of the Tower. The duke of Suffolk was soon after tried, condemned and executed; but would have met with more compassion, had not his
England. ambition been the cause of his daughter's unhappy fate just mentioned. Sir Thomas Gray also lost his life on the same account: but the cruel spirit of Mary was still unsatisfied; and finding herself universally odious, that she might free herself from any apprehensions for what was past, as well as tyrannize with the more freedom in time to come, she disabled the people from resistance, by ordering general mutters, and causing the commissioners seize their arms and lay them up in forts and castles.

Notwithstanding this unpopularity, however, the rebellion of Wyatt had so strengthened the hands of government, that a parliament was assembled in hopes of gratifying the queen's wishes in regard to her marriage with Philip of Spain. To facilitate this purpose also, the Emperor of Germany sent over to England 400,000 crowns to be distributed among the members of parliament in bribes and pensions; a practice of which there had hitherto been no example in England. The queen, notwithstanding her bigotry, resumed the title of Supreme Head of the Church, which she had dropped three months before. Gardiner made a speech, in which he proposed, that they should invest the queen with a legal power of disposing of the crown, and appointing her successor; but the parliament, however obsequious in other respects, did not choose to gratify their sovereign in a measure by which the kingdom of England might become a province of the Spanish monarchy.

They would not even declare it treason to imagine or attempt the death of the queen's husband during her life time, though they agreed to ratify the marriage with Philip was solemnized; but as the accession of the new king of England, he no sooner found himself disappointed in this than he showed a total want of affection for her as a wife. He passed most of his time at a distance from her in the Low Countries: and seldom wrote to her except when he wanted money, with which Mary would at all times gladly have supplied him even had it been at the expense of her kingdom, if in her power.

The enemies of the state being suppos'd to be suprised, those of the Catholic religion were next persecuted. The old fanatical laws which had been rejected by former parliament were now revived. Orders were given, that the priests and bishops who had married should be ejected; that the mass should be restored, and the pope's authority established; and that the church and its privileges, all but their goods and estates should be put on the same footing on which they were before the commencement of the reformation. But as the gentry and nobility had already divided the church lands among them, it was thought inconvenient, and indeed impossible, to make a restitution of thefe. The perfons who chiefly promoted these meafures were Gardiner bishop of Winchester; and Cardinal Pole, who was a kind of Henry VIII. but had been long in Italy, and was now returned from thence. He was then burning the Protfeftants; but the former, perceiving that rigorous meafures would be most agreeable to the king and queen, declared himself against it. He was too prudent, however, to appear in perfon at the head of the persecution; and therefore configned that office to Bonner bishop of London, a man of a very abandoned character. The bloody scene began by the execution of Hooper bishop of Gloucester, and Rogers prebendary of St Paul's. These were quickly followed by others, of whom the principal were Archbishop Cranmer, Ridley bishop of London, and Latimer bishop of Worcester. These perfecutions soon became odious to the whole nation, and the perpetrators of them were all willing to throw the blame from themselves upon others. Philip endeavoured to fadden the whole reproach upon Bonner; but that bishop would not take the whole, and therefore retorted on the court. A bold step was now taken to introduce a court similar to the Spanish inquisition, that should be empowered to try heretics, and condemn them without any other law but its own authority. But even this was thought a method too dilatory in the present exigence of affairs. A proclamation infixed against books of herefy, treason, and sedition, declared, that whosoever had such books in his possession, and did not burn them without reading, should suffer as a rebel. This was attended with the execution of such numbers, that at last the magistrates who had been instrumental in these cruelties refused to give their affent any longer. It was computed, that during this persecution, 277 persons suffered by fire, besides those punished by imprisonments, fines, and confiscations. Among those who suffered by fire were 5 bishops, 21 clergymen, 8 lay-gentlemen, 84 tradefmen, 555 householders, 55 women, and 4 children.

The only remarkable transaction which happened during this reign with regard to the temporal affairs of the kingdom was the loss of Calais, which had been in the possession of the English for upwards of 200 years.* This loss filled the whole kingdom with complaints, and the queen with grief. She was heard to say, that, when dead, the name of Calais would be found engraven on her heart. She did not long survive this loss; but died in the year 1558, of a lingering illness, after a reign of five years four months and eleven days.

After the death of Mary, the Prince of Elizabeth succeeded to the throne without opposition. She was at Hatfield when news of her sister's death were brought her: upon which she hastened up to London, where she was received with great joy. This prince was well qualified for government. She had judgment sufficient to make choice of proper ministers, and authority enough to keep her subjects in awe. The restraints also, to which she had been subjected during her sister's reign, had taught her so well to conceal her sentiments, that she had become a perfect mistress of dissimulation; which, though no commendable part of her character, proved occasionally of great service to her government. She perfected the reformation, and put the religion of England upon the same plan which subsists at present. This was accomplished without the least difficulty: for the persecutions in Mary's reign had served only to give the whole nation an aversion for popery. In the time of Edward VI. the people had been compelled to embrace the Protestant religion, and their fears induced them to conform; but now, almost the whole nation were Protfeftants from inclination. The reformation was confirmed by act of parliament in 1559, and thus
England were now excited to attempt invasions in their turn; which they executed in numerous desperates on the Spanish coasts; though these were only temporary, and designed not for permanent conquest, but to harass the enemy. It would be endless to relate all the advantages obtained over the enemy at sea, where the capture of every ship must have made a formidable narrative. It is sufficient to observe, that the sea-captains of that reign are still considered as the boldest and most enterprising set of men that England ever produced; and among this number we are to reckon Raleigh and Howard, Drake, Cavendish, and Hawkins. The English navy then began to take the lead; and has since continued irresistible in all parts of the ocean.

Elizabeth continued to reign with great glory till the year 1603; but all her great minds could not prevent her from being extremely miserable before her death. She had cauflé her greatest favourite, and probably her lover, the Earl of Essex, to be executed. Though this execution could not be called unjust, the queen's remorse and affection (on being informed that he had at last thrown himself entirely on her clemency) returned to such a degree, that she thenceforth gave herself entirely over to despair. She refused food and sustenance; she continued silent and gloomy; sights and groans were the mildest of all the griefs, which her maid brought her. Perhaps the faculties of her mind were impaired by long and violent exerce; perhaps she reflected with remorse on some past actions of her life, or perceived, but too strongly, the decay of nature, and the approach of her dissolution. She saw her courtiers remitting in their affiduity to her, in order to pay their court to James the apparent successor. Such a concurrence of causes was more than sufficient to destroy the remains of her constitution; and her end was now visibly seen to approach. Feeling a perpetual heat in her stomach, attended with an unquenchable thirst, she drank without ceasing, but refused the assistance of her physicians. Her distemper gaining ground, Cecil and the lord admiral defirèd to know her sentiments with regard to the succession. To this she replied, That as the crown of England had always been held by kings, it ought not to devolve upon any other character, but upon her immediate heir the king of Scotland. Being then advised by the archbishop of Canterbury to fix her thoughts upon God, she replied, that her thoughts did not in the least wander from him. Her voice soon after left her; she fell into a lethargic stumber, which continued some hours; and she expired gently without a groan, in the 70th year of her age, and 45th of her reign. She was succeeded by James I. King of Scotland; since which time the history of both England and Scotland is comprehended under the article BRITAIN.

Since the Norman conquest, England has been divided into six circuits, each circuit containing a certain number of counties. Two judges are appointed for each circuit, which they visit in the spring and autumn, for administering justice to the subjects who are at a distance from the capital. In holding the Lent (or spring) assizes, the northern circuit extends only to York and Lancaster; the assizes at Durham, Newcastle, Carlisle, and Appleby, being held only in the autumn.
England contains about 60 archdeaconries. Subordinate to them are the rural deacons, formerly styled archpriestyers, who signify the bishop’s pleasure to his clergy, the lower clafs of which consists of parishes (who are called rectors or vicars), deacons, and curates. See the articles Curate, Deacon, Parson, and Vicar.

The following is a list of the English bishops, with their revenues, as charged in the king’s books: though that sum is far from being the real annual value of the fee, yet it affiusts in forming a comparative of the estimate between the revenues of each fee with those of another.

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Thefe three bishops take precedency of all others in England, and the others according to the seniority of their consecrations.

Besides the 40 counties into which England is divided, there are counties corporate, consisting of certain districts, to which the liberties and jurisdiction are peculiar to a county that have been granted by charter from the crown. Thus the city of London is a county distinct from Middlesex; the cities of York, Chester, Bristol, Norwich, Worcester, and the towns of Kingston upon Hull and Newcastle upon Tyne, are counties of themselves, distinct from those in which they lie. The same may be said of Berwick upon Tweed, which lies in Scotland, and has within its jurisdiction a small territory of two miles on the north side of the river. Under the name of a town, boroughs and cities are contained: for every borough or city is a town, though every town is not a borough or city. An account of the English constitution and government is given under the articles King, Lords, Commons, Parliament, Law, Liberty, Rights, &c.

Religion.

The established religion of England is Episcopacy. Since the reign of Henry VIII. the sovereigns of England have been called, in public wrote, the supreme heads of the church; but this title conveys no spiritual meaning, as it only denotes the regal power to prevent any ecclesiatical differences, or, in other words, to substitute the king in place of the pope before the reformation, with regard to temporalities and the internal economy of the church. The kings of England never intermeddle in ecclesiastical disputes, and are contented to give a sanction to the legal rights of the clergy.

The church of England, under this description of the monarchial power over it, is governed by two archbishops, and 24 bishops, besides the bishops of Sodor and Man, who, not being possessed of an English barony, does not sit in the house of peers. See Archbishop and Bishop.

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prove by many strong and conclusive arguments, as by
their religion, manners, customs, and the nearness of
their situation. But now we have very small remains
of the ancient Briton tongue, except in Wales, Corn-
wall, the isles and Highlands of Scotland, part of
Ireland, and some provinces of France; which will not
appear strange, when what follows is considered.

Julius Cæsar, some time before the birth of our Sa-
vior, made a descent upon Britain, though he may
be said rather to have discovered than conquered it;
but about the year of Christ 45, in the time of Clau-
dius, Aulus Plautius was sent over with some Roman
forces, by whom two kings of the Britons, Togudun-
mas and Caractacus, were both overcome in battle:
whereupon a Roman colony was planted at Malden in
Eicse, and the southern parts of the island were redu-
ced to the form of a Roman province; after that, the
island was conquered as far north as the friths of Dun-
barton and Edinburgh, by Agricola, in the time of
Domitian; whereupon a great number of the Britons,
in the conquered part of the island, retired to the west
part called Wales, carrying their language with them.

The greatest part of Britain itself thus became a
Roman province, the Roman legions, who resided in
Britain for above 200 years, undoubtedly disseminated
the Latin tongue; and the people being afterwards go-
verned by laws written in Latin, must necessarily make
a mixture of languages. This seems to have been the
first mutation of the language of Britain suffered.

When the British tongues continued, for some time,
mixed with the provincial Latin, till, the Roman
legions being called home, the Scots and Picts took the
opportunity to attack and harass England: upon
which, K. Vortigern, about the year 440, called the
Saxons to his assistance; who came over with several
of their neighbours, and having repulsed the Scots
and Picts, were rewarded for their services with the title
of Thanet and the whole county of Kent; but growing
too powerful, and not being contented with their
allowance, dispossessed the inhabitants of all the coun-
try as far as the Severn: thus the British tongue was
in a great measure destroyed, and the Saxon intro-
duced and spread.

What the Saxons tongue was long before the con-
quisto, about the year 700, we may observe in the most
ancient manuscript of that language, which is a globs
on the Evangelists, by bishop Eddris, in which the three
first articles of the Lords prayer run thus:

"Uren fader the arth in hoefnas, sic gelahguard thin
noma fo cymeth thin ric. Sic thin willa fie is hoef-
nas, and n in cortho," &c.

In the beginning of the ninth century the Danes in-
vaded England; and getting a footing in the northern
and eastern parts of the country, their power gradually
increased, and they became sole masters of it in about
200 years. By this means the ancient Briton obtained
a tincture of the Danish language; but their go-

government being of no long continuance, did not make
so great an alteration in the Anglo-Saxon as the next
revolution, when the whole land, A.D. 1067, was
subdued by William the conqueror, Duke of Norma-
dy in England: for the Normans, as a monument of
their conquest, endeavoured to make their language as
generally received as their commands, and thereby
rendered the Briton language an entire medley.

·About the year 900, the Lord's prayer, in the an-
cient Anglo-Saxon, ran thus:

"Thine owr fader the arth in heofonn, sic thin nama
gehalgod; came thin rice thin willa on corthan fwa,
\two on heofonn," &c.

About the year 1160, under Henry II. it was ren-
dered thus by Pope Adrian, an Englishman, in rhyme:

"Ure fader in heaven rich,
Thy name be halyed ever lich,
Thou bring us thy mache blisse;
As hit in heaven y doe,
Evar in yearth been it alo,"

Dr Hicks gives us an extraordinary specimen of the
English, as spoken in the year 1385, upon the very
subject of the English tongue.

"As it is knowe how many maner peple beeth
this land; ther beeth also so many dyvers langages
and tongs. Nothelss Walsche and Scots that beeth
nought medled with other nation, holdeth wel nyh hir
firste langage and speche; but yif the Scottes, that
were sometime confederate and woned with the Pítes,
draw somewhat after hir speche; but the Flemynge,
that woned on the west side of Wales, haveth lost
harrange spech, and spekeeth Saxonliche now. Also
Englishmen, they had from the byggynynge three maner
speche; northerne, fourtherne, and middle speche in
the middle of the lond, as they come of three maner
of peple of Germania: nothelss by commyxtion and
mellynges first wifh with Danes, and afterwaerd with
Normans, in meny the contrary langage is asayred (cor-
rupted.)."

"This asarynge of the burch of the tange is
bycause of tweie things; oon is for children in scole agens
the usage and manner of all other nations, beeth comp-
pelled for to leve hir owne langage, and for to confru
hir lessons and Here things in Frænche, and so they
haveth feth the Normans comse first into England. Also
gentlemen children beeth tought to speke Frænche
from the tym that they beeth roked in here cradel,
and kenneth speke and play with a child's broche; and
upplodifche men will lyke hymselfe to gentilmen, and
fonde with great benefyle for to speke Frænche to be
told of.—Hit seemeth a greet wonder how Eng-
lischemen and his owne langage and tongs is dyver-
sed of fown in this oon ieland: and the langage of
Normandie is complyne of another lond, and hath oon maner
foun amonge alle men that spekeith it aright in En-
glond. Also of the foresaid Saxon tongs that is deled
dived (divided) a three, and is abide fearecellich with fewe
upplodifche men, is greet wonder. For men of the eft,
with men of the west, is, as it were, under the same
parts of hevene accordeth more in fownynge of speche,
than men of the north with men of the south. There-
fore it is that Mercil, that beeth men of myddle Eng-
land, as it were, partners of the endes, underfondeth
betre the side longes northerne and fourtherne, than
northerne and fourtherne underfondeth either other.
—All the langage of the Northumbers and spechial-
liche at York, is fo scharp, flatting and froyntyng, and
unschape, that we fourthermen may that langage
unmeth the underfondere," &c.

In the year 1537, the Lord's prayer was printed as
follows: "O our father which arte in heven, hallow-
be thy name: let thy kingdom come, thy will be
fulfilled as well in erth as it is in heven; give us this
daye
ENG [ 662 ]

English

daye in dayly bred," &c. Where it may be observed, that the dictiou is brought almoft to the prefent standard, the chief variations being only in the orthography. By these infiances, and many others that might be given, it appears, that the English Saxon language, of which the Normans depofied us in a great meafure, had its beauties, was signifiant and emphatical, and preferable to what they imposed on us. "Great, verily (fays Cambden), was the glory of our tongue, which the Normans defpoiled us in a great meafure, having been a long time a trading nation, whereby offices, dignities, names of wares, and terms of traffic, are introduced, which we take with the wares from the perfons of whom we have them, and form them anew, according to the genius of our own tongue; and besides this change in the language, arising from commerce, Britain's having been a coniderable time subject to the fce of Rome, in eccleiafiical affairs, muft unavoidably have introduced fome Italian words among us. Secondly, As to the particular properties of a language, our tongue has undergone no fmall mutation, or rather has received no fmall improvement upon that account: for, as to the Greek and Latin, the learned have, together with the arts and sciences now rendered familiar among us, introduced abundance; nay, almost all the terms of art in the mathematics, philofophy, phylfic, and anatomy; and we have entertained many more from the Latin, French, &c. for the fake of neatnefs and elegance; fo that, at this day, our language, which, about 1800 years ago, was the ancient Britifh, or Welsh, &c. is now a mixture of Saxon, Teutonic, Dutch, Danifh, Norman, and modern French, embellifhed with the Greek and Latin. Yet this, in the opinion of fome, is fo far from being a disadvantage to the English tongue as now fpoken (for all languages have undergone changes, and do continually participate with each other), that it has fo enriched it, as now to render it the moft copious, signifiant, fluent, courteous, and fiaculous language in Europe, if not in the world.

ENGRAFTING, in gardening. See Grafting.

ENGRAILED, or Engrailed, in heraldry, a term derived from the French engrai, "hail;" and signifying a thing the hail has fallen upon and broke off the edges, leaving them ragged, or with half-rounds, or fiemicres, ftruck out of their edges.

ENGRAVING, the art of cutting metals and precious flones, and repreffing thereon figures, letters, or whatever device or design the artist fancies.

Engraving, properly a branch of sculpture, is divided into several other branches, according to the matter wherein it is employed, and the manner of performing it. For the rudifel branch, that of Engraving on Wood. See Carving in Wood.

Engraving on Copper, the making, correspondingly to some delineated figure or design, fuch concave lines on a smooth surface of copper, either by cutting or Engraving, or defign, as render it capable, when charged properly with any coloured fluid, of imparting by compreflion the exact representation of the figure or design to paper or parchment.

Whether we consider the art of engraving, with regard to the utility and pleafure it affords, or the difficulty that attends its execution, we cannot but confefs, that on every account it deferves a definguifhed rank among the polite arts. It is by means of this art that the cabinet of the curious are adorned with the portraits of the greatest men of all ages and all nations; that their memories, their moft remarkable and moft glorious actions, are transmitted to the lafi posterity. It is by this art alfo, that the paintings of the greatest masters are multiplied to a boundlefs number; and that the lovers of the polite arts, diffused over the face of the whole earth, are enabled to enjoy fome beauties from which their diftant fituations seemed to have for ever debarred them; and perfons of moderate fortune are hereby enabled to become possessed of all the spirit, and all the poetry, that are contained in thofe miracles of art, which feemed to have been refeived for the temples of Italy, or the cabinets of princes. When we refleét, moreover, that the engraver, beside the beauties of poetic compofition, and the artful ordi­nance of design, is to exprefs, merely by the means of light and shade, all the various tints of colours and clar of obscure; to give a relief to each figure, and a truth to each object; that he is now to paint a sky ferene and bright, and then loaded with dark clouds; now the pure tranquil stream, and then the foaming, raging sea; that here he is to exprefs the character of the man, strongly marked in his countenance, and there the minute ornament of his drefs; in a word, that he is to represent all even the moft difficult objects in nature; we cannot sufficiently admire the vah improve­ments in this art, and that degree of perfection to which it is at this day arrived. See the article Prints.

Engraving is an art, for the greatest part, of modern invention; having its rife no earlier than the middle of the 15th century. The ancients, it is true, practiced engraving on precious flones and crys­tals with very good success; and there are still many of their works remaining equal to any production of the later ages. But the art of engraving on plates and blocks of wood, to afford prints or impres­sions, was not known till after the invention of painting in oil.

The different modes of engraving are the following:

In strokes cut through a thin wax, laid upon the copper, with a point, and these strokes bitten or cor­roded into the copper with aquafortis. This is called etching.

In strokes with the graver alone, unabfifted by aquafortis. In this infiance, the defign is traced with a sharp tool, called a dry point, upon the plate; and the strokes are cut or ploughed upon the copper with an instrument dif­tiguifhed by the name of a grauer.

In strokes first etched and afterwards finished with the graver; by this expedient the two former methods are united.

In dots without strokes, which are executed with the point upon the wax or ground, bitten in with the aquafortis, and afterwards harmonized with the gra­ver, by the means of which innumerable small dots are made.

ENGRAVING, the art of cutting metals and pre­cious flones, and repreffing thereon figures, letters, or whatever device or design the artist fancies.
Engraving made; or with the graver alone, as in the flesh and finer parts, unafliffed with the point.

In dots first etched and afterwards harmonized with the dry point, performed by a little hammer called opus nucul, or the work of the hammer, as practised by Lutma and others.

In mezzotinto, which is performed by a dark barb or ground being ruled uniformly upon the plate with a toothed tool. The design being traced upon the plate, the light parts are scraped off by instruments for that purpose, in proportion as the effect requires.

In aquatintas, a newly invented method of engraving. The outline is first etched, and afterwards a fort of walk is laid by the aquafortis upon the plate, resembling drawings in Indian ink, bifter, &c.

On wood, performed with a single block, on which the design is traced with a pen, and those parts which should be white carefully hollowed out; and this block is afterwards printed by the letter-presf printers, in the fame manner as they print a book.

On wood, performed with two, three, or more blocks; the first having the outlines cut upon it; the second is reserved for the darker shadows; and the third for the shadows which terminate upon the lights; and these are subfitted in their turn, each block receiving an impression from every block. This mode of engraving is called chiaro-furo, and was designed to represent the drawings of the old masters.

On wood and on copper: in these the outline is engraved in a bold dark file upon the copper; and two or more blocks of wood are substituted to produce the darker and lighter shadows, as before.

Of all these modes of engraving, the most ancient is that on wood; or, to speak more properly, the first impreffions on paper were taken from carved wooden blocks. For this invention it appears that we are indebted to the brief-makers or makers of playing-cards, who practifed the art in Germany about the beginning of the 15th century. From the fame fource may perhaps be traced the firft idea of movable types, which appeared not many years after; for these brief-makers did not entirely confine themselves to the printing and painting of cards; but produced alfo subjects of a more devote nature; many of which, taken from holy writ, are still preferved in different libraries in Germany, with the explanatory text facing the figures; the whole engraved in wood. In this manner they even formed a species of books; fuch as, Historia fanti Johannis, ejufque Visiones Apclyptiche; Historia Veteris & Novi Testamenti, known by the name of the Psor Man's Bible. These short mementos were printed only on one side; and two of them being pasted together, had the appearance of a single leaf.

The earliesf date on any of these wooden cuts is 1423. The subject is St. Christopher carrying the Infant Jesus over the Sea, preferved in a convent at Buxheim near Mennengen. It is of a folio fize, illuminated in the fame manner as the playing cards; and at the bottom is this inscription, Gratiff erifacem die quam ungue tuetur. Illa tenem di morte mala non moriortis. Millesimo CCCXC XIX teris.

Upon the invention of movable types, that branch of the brief-makers business, fo far as it regarded the making of books, was gradually discontinued; but the art itself of engraving on wood continued in an im-

proofing state; and towards the end of the 15th and beginning of the 16th century, it became customary for almost every one of the German engravers on copper to engrave on wood also. The works of Albert Durer in this style of engraving are justly held in the highest esteem. Italy, France, and Holland, have produced many capital artists of this kind; but for boldness and spirit, we muft fee the prints of Christoph Jerger, who worked under the direction of Rubens, and was without doubt as fatisfyed by that great master.

The invention of that species of engraving diffinguifhcd by the appellation of chiaro-furo, seems alfo to be juftly claimed by the Germans, and first practifed by Mair; one of whose prints of this kind is dated 1499. Many excellent works in chiaro-fero have been produced in France; and in Italy it was honour'd with the performances of Titian and Parmegiano; but the attempts of Jackfon, Kirkall, and others in England, have not been equally fuccefsful. A fet of excellent prints in this way have lately been published by J. Skippe, Esq; a connoifleur and dilettante.

In Germany, about the year 1450, prints from engraved copper firft made their appearance. The earliesf date of a copperplate print is indeed only 1461; but it is ftrange that the fubftitution of the drawing, or defective in point of taste, the mechanical part of the execution of it has by no means the appearance of being one of the firft productions of the graver. We have alfo feveral other engravings, evidently the work of the fame master; in which the impreffions are fo nearly taken from the plates, and the engravings fo clearly printed in every part, that, according to all appearance, they could not be executed in a much better manner in the preffent day, with all the conveniences which the copperplate printers now possess, and the additional knowledge they muft neceffarily have acquired in the course of more than three centuries. Hence we may fairly conclude, that if they were not the firft specimens of the engravers workmanship, they were much less the firft efforts of the copperplate printer's ability. It is likewife to be observed, that Martin Schoen, who is faid, with great appearance of truth, to have worked from 1450 to 1486, was apparently the scholar of Stoltzhiir; for he followed his fyle of engraving, and copied from him a fet of prints, representing the paffion of our Saviour. Now, allowing Stoltzhiir to have preceded his disciple only ten years, this carries the era of the art back to 1450, as was faid above. There is no ground to fuppofe that it was known to the Italians till at leaft ten years afterwards. The earliesf prints that are known to be theirs are a fet of the seven planets, and an almanack by way of frontifpiece; on which are direc-
Engraving. which we know at least were designed by him; and as Baldini, is expressly said to have worked from the designs of Botticelli, it will appear most probable that they belong to Finiguerra.

With respect to the invention of etching, it seems to be not well known to whom it is to be ascribed. One of the most early specimens is that print by Albert Durer, known by the name of the Canon, dated 1518, and thought by some, with little foundation, to have been worked on a plate of iron. Another etching by the same artist is Moses receiving the Tables of the Law, dated 1524. It was also practiced in Italy soon after this by Parmegiano, in whose etchings we discover the hand of the artist working out a system as it were from his own imagination, and striving to produce the forms he wanted to express. We see the difficulty he laboured under; and cannot doubt, from the examination of the mechanical part of the execution of his works, that he had no instruction; and that it was something entirely new to him. If the story is true, that he kept an engraver by profession in his house, the novelty of the art is rendered so much the more probable. He died in 1540.

As to that species of engraving in which the modes of etching and cutting with the graver are united, it must have been found necessary immediately upon the invention of etching; it was, however, first carried to perfection by G. Aurdan, and is now almost universally practiced, whether the work is in strokes or in dots. Engraving in dots, the present fashionable method, is a very old invention, and the only mode discovered by the Italians. Agostino de Muis, commonly called Aquilino of Venice, a pupil of Marc Antonio, used it in several of his earliest works, but confined it to the flech, as in the undated print of An Old Man seated upon a Bank, with a Cottage in the back ground. He flourished from 1509 to 1536. We also find it in a print of "A single Figure standing, holding a Cup and looking upwards," by Giulio Campagnola, who engraved about the year 1516. The back ground is executed in dots, and upon dry point. The figure is outlined with a stroke deeply engraved, and finished with dots, in a manner greatly resembling those prints which Demarteau engraved at Paris in imitation of red chalk. The hair and beard are expressed by strokes. Stephen de Launir, a native of Germany, followed the fleps of Campagnola; and many of his flight works are executed in dots only. John Boulanger, a French artist, who flourished in the middle of the last century, and his contemporary Nicholas Van Pattenberg, improved greatly on this method, and practiced it with much success. It is only, however, of late, that it has been considered as an object worthy of general imitation. John Lutma executed this kind of work with a hammer and a small punch or chisell.

The method of engraving in mezzotinto was invented about the middle of the 17th century; and the invention has generally been attributed to Prince Rupert, though it has also been asserted that he learnt the secret from another. See Mezzotinto.

Engraving in aquatint is quite a recent invention, and seems at once to have been carried to perfection by Sandby and other living artists. See Aquatinta.

Engraving with the tool was the kind originally practiced, and it is yet retained for many purposes. For though the manœuvre of etching be more easy, and other advantages attend it; yet where great regularity and exactness of the stroke or lines are required, the working with the graver is much more effectual: on which account it is more suitable to the precision necessary in the execution of portraits; as there every thing the most minute must be made out and expressed, according to the original subject, without any licent to the fancy of the designer in deviating from it, or varying the effect either by that matterly negligence and simplicity in some parts, or those bold sallies of the imagination and hand in others, which give spirit and force to history-painting.

The principal instruments used in engraving with the tool are, gravers, scrapers, a burnisher, an oil-stone, and a cushion for bearing the plates.

Gravers are made in several forms with respect to the points, some being square, others lozenge; the square graver for cutting broad and deep, and the lozenge for more delicate and fine strokes and hatches. La Boë recommends, as the most generally useful, such as are of a form between the square and lozenge: and he advises, that they should be of a good length; small towards the point, but stronger upwards, that they may have strength enough to bear any force there may be occasion to lay upon them; for if they be too small and mounted high, they will bend; which frequently causes their breaking, especially if they be not employed for very small subjects.

The burnisher is used to assist in the engraving on some occasions, as well as to polish the plates. It is seven inches in length, and made of fine steel well polished. The burnisher is formed at one end, and a scraper on the other, each about an inch and a half long from the point: betwixt them, about four inches of the instrument is made round, and serves as a handle; and is thicker in the middle than at the necks, where the burnisher and scraper begin, which necks are only one quarter inch in diameter. The principal application of it in engraving, besides its use in polishing the plates, is to take out any scratches or accidental defacings that may happen to the plates during the engraving; or to lessen the effect of any parts that may be too strongly marked in the work, and require to be taken down.

A cushion, as it is called, is likewise generally used for supporting the plate in such a manner, that it may be turned every way with ease. It is a bag of leather filled with sand, which should be of the size that will best suit the plates it is intended to bear. They are round, and about nine inches over, and three inches in thickness.

The cushion, made as above directed, being laid on the table, the plate must be put upon it; and the graver being held in the hand in a proper manner, the point must be applied to the plate, and moved in the proper direction for producing the figures of the lines intended: observing, in forming straight lines, to hold the plate steady on the cushion; and where they are to be finer, to press more lightly, using greater force where they are to be broader and deeper. In making circular or other curve lines, hold your hand and graver steadily; and as you work, turn your...
Engraving. your plate upon the cushion against your graver, otherwise it will be impossible for you to make any circular or curved line with that neatness and command of hand you by this means may. After part of the work is engraved, it is necessary to scrape it with the scraper or graver passed in the most level direction over the plate to take off the roughness formed by the cutting of the graver; but great care must be taken not to incise too much edge on the scraper or tool used, in such a manner that it may take the least hold of the copper, as it would otherwise produce false strokes or scratches in the engraving; that the engraved work may be rendered more visible, it may afterwards be rubbed over with a roll of felt dipped in oil. In using the graver, it is necessary to carry it at a level as possible with the surface of the plate; for otherwise, if the fingers slip between them, the line that will be produced, whatever curve or straight, will become deeper and deeper in the progress of its formation; which entirely prevents strokes being made at one cut, that will be fine at their extremities, and larger in the middle; and occasions the necessity of retouching to bring them to the proper degree of shade. For this reason, for those who would learn to engrave in perfection, to endeavour, by frequent trials, to acquire the habit of making such strokes both straight and curving, by lightening or sinking the graver with the hand, according to the occasion. If, after finishing the design, any scratches appear, or any part of the engraving be falsely executed, such scratches, or faulty parts, must be taken out by the burnisher, and further polished, if necessary, by the above mentioned roll.

The plate being thus engraved, it is proper to round off the edges, by using first a rough file, and afterwards a smoother; and to blunt the corners a little by the fame means: after which, the burnisher should be passed over the edges to give it a further polish.

The dry point, or needle, which has been of late much used in engraving, is a tool like an etching point, which being drawn hard on the copper, cuts a stroke, and raises a burr; the burr is scraped off, and there remains a stroke more soft and delicate than can be produced in any other way.

In the conduct of the graver and dry point consists all the art; for which there are no rules to be given; all depending on the habitude, disposition, and genius, of the artist. However, besides the explanations already given, some general observations and directions may not be improper. As the principles of engraving are the same with those of painting, a person cannot expect to attain any considerable degree of perfection in this art who is not a good master of design; and therefore he ought to be well acquainted both with perspective and architecture: for the former, by the proper gradations of strong and faint colours, will enable him to throw backwards the figures and other objects of the picture or design which he proposes to imitate; and the latter will teach him to preserve the due proportion of its several orders, which the painter often entrusts to the discretion of the engraver. In order to preserve equality and union in his works, the engraver should always sketch out the principal objects of his piece before he undertakes to finish them. In working, the strokes of the graver should never be crooked too much in a lozenge manner, particularly in the representation of flesh, because sharp angles produce the unpleasing effect of lattice-work, and take from the eye the repose which is agreeable to it in all kinds of picturesque designs: we should except the case of clouds, tempests, waves of the sea, the skins of hairy animals, or the leaves of trees, where this method of crossing may be admitted. But in avoiding the lozenge, it is not proper to get entirely into the square, which would give too much of the hardness of stone. In conducting the strokes, the action of the figures, and of all their parts, should be considered; and it should be observed how they advance towards, or recede from the eye; and the graver should be guided according to the risings or cavities of the muscles or folds, making the strokes wider and fainter in the light, and closer and firmer in the shades. Thus the figures will not appear jagged; and the hand should be lightened in such a manner, that the outlines may be formed and terminated without being cut too hard; however, though the strokes break off where the muscle begins, yet they ought always to have a certain connection with each other, so that the first stroke may not serve by its return or the second, which will show the freedom of the engraver.

In engraving the flesh, the effect may be produced in the lighter parts and middle tints by long pecks of the graver, rather than by light lines; or by round dots; or by dots a little lengthened by the graver; or, best of all, by a judicious mixture of these together.

In engraving the hair and the beard, the engraver should begin his work by laying the principal grounds, and sketching the chief shades in a careless manner, or with a few strokes; and he may finish it at leisure with finer and thinner strokes to the extremities. When architecture or sculpture is to be represented, except it be old and ruinous buildings, the work ought not to be made very black; because, as edifices are commonly constructed either of stone or white marble, the colour, being reflected on all sides, does not produce dark or brown shades as in other substanctes. White points must not be put in the pupils of the eyes of figures, as in engravings after paintings; nor must the hair or beard be represented as in nature, which makes the locks appear flowing in the air; because in sculpture there can be no such appearances.

In engraving cloths of different kinds, linen should be done with finer and closer lines than other forts, and be executed with gentle strokes. Woollen cloth should be engraved wide, in proportion to the coarseness or fineness of the stuff, and with only two strokes; and when the strokes are crossed, the second should be smaller than the first, and the third than the second. Shining stuffs, which are generally of silk or satin, and which produce flat and broken folds, should be engraved more hard and more straight than others, with one or two strokes, as their colours are bright or brown; and between the first strokes the smaller must be joined, which is called interlining. Velvet and plush are expressed in the same manner, and should always be interlined. Metals, as armour, &c. are also represented by interlining, or by clear single strokes. In architecture, the strokes which form the rounding object should tend to the point of light; and when
Engraving. By the whole columns occur, it is proper to produce the effect as much as possible by perpendicular strokes. If a grofs stroke is put, it should be at right angles, and wider and thinner than the first stroke. In engraving mountains, the strokes ought to be frequently dis continued and broken, for sharp and craggy objects; and they should be straight, in the lozenge manner, and accompanied with long points or dots; and rocks should be represented by crofs strokes more square and even. Objects that are distant towards the horizon should be kept very tender, and slightly charged with black. Waters that are calm and still are best represented by strokes that are straight, and parallel to the horizon, interlined with those that are finer; omitting such places as, in consequence of gleams of light, exhibit the shining appearance of water; and the form of objects reflected from the water, at a small distance upon it, or on the banks of the water, are expressed by the same strokes, retouched more strongly or faintly as occasion may require, and even by some that are perpendicular. For agitated waters, as the waves of the sea, the first strokes should follow the figure of the water, and may be interlined, and the crofs strokes ought to be very lozenge. In engraving clouds, the graver should sport when they appear thick and agitated, in turning every way according to their form and their agitation. If the clouds are dark, so that two strokes are necessary, they should be crossed more lozenge than the figures, and the second strokes should be rather wider than the first. The flat clouds, that are left indifferently in the clear sky, should be made by strokes parallel to the horizon, and a little waving; if second strokes are required, they should be more or less lozenge; and when they are brought to the extremity, the hand should be so lightened, that they may form no outline. The flat and clear sky is represented by parallel and straight strokes, without the leaf turning. In landscapes, the trees, rocks, earth, and herbage should be etched as much as possible; nothing should be left for the graver but perfecting, softening, and strengthening. The dry point produces an effect more delicate than the graver can, and may be used to great advantage in linen, skies, distances, ice, and often in water, especially in small engravings. In most things it is proper to etch the shadows, only leaving the lighter tints for the dry point, graver, &c.

To imitate chalk-drawings, a mixture of varied and irregular dots are used, made more or less soft, so as to resemble the grain produced by the chalks on paper. Every stroke of the chalks on paper may be considered as an infinite number of adjoining points, which are the small eminences of the grain of the paper touched by the chalk in passing over it. When the copper-plate has been polished and varnished, or properly prepared, as in the common method of engraving, the drawing to be imitated may be counterproofed on the varnish of the plate. If this cannot be conveniently done, black lead pencil, or red chalk, must be applied to varnished or oiled paper; and by means of this chalk or pencil, all the traces of the original will be transferred to the varnish. The outlines of the object must be formed in the etching by points, whose magnitude and distance must be determined by the quality of the strokes in the original drawing. The artist may be provided with pointed instruments or needles of various sizes with single or double points. In forming the light and shade, he should distinguish between those hatches which serve to express the perspective of the object and those which form the ground of it. The principal hatches should be more strongly marked; the middle tints, if etched, should be marked lightly, or they may be left till the varnish is taken off, and be perfected with a greater degree of softness, by needles or the point of the graver, as the original may require. There is nothing peculiar in the method of applying the aquafortis in this kind engraving; but it may be observed, that it should not be left so long as to corrode the lighter parts too much: if the light parts are sufficiently corroded, they may be flopped out with turpentine varnish and lamp-black mixed together, and the aquafortis may be applied again to the stronger parts; and in this way it will be no detriment to them, if the points; which compose the shade burst into one another, provided the extreme be avoided. When the work of the aquafortis is finished, and the varnish taken off the copper, it will be necessary in the fofter parts, such as the leath, &c. to intertiple with proper points; as an effect will be thus produced more delicate than it is possible to attain with the aquafortis only; and the strongest shades will require additional strength to be given them with small strokes of the graver. Drawings made with chalks of different colours may be imitated in this manner, if a plate be provided for every colour.—This method of engraving is intended to form a kind of deception, so that the connoisseur may not be able, on the first inspection, to distinguish between the original drawing and the engraving made in imitation of it; and it is extremely useful, as it serves to multiply copies of drawings left by those masters who excelled in the use of chalks, and thus to form and improve young artists, who could not have access to the originals in the practice of drawing.

Engraving upon Ciffs. See Chemistry, 2d No. 857.

Engraving on Precious Stones, is the representing of figures, or devices, in relief or indented, on divers kinds of hard polished stones.

The art of engraving on precious stones is one of those wherein the ancients excelled; there being divers antique agates, cornelians, and onyxes, which surpass any thing of that kind the moderns have produced. Pyrgotes among the Greeks, and Dioscorides under the first emperors of Rome, are the most eminent engravers we read of: the former was so esteemed by Alexander, that he forbid any body else to engrave his head; and Augustus's head, engraved by the latter, was deemed so beautiful, that the succeeding emperors chose it for their seal.

All the polite arts having been buried under the ruins of the Roman empire, the art of engraving on stones met with the same fate. It was retrieved in Italy at the beginning of the 15th century, when one John of Florence, and after him Dominic of Milan, performed works of this kind no way to be defpised. From that time the finest figures became common enough in Europe, and particularly in Germany, whence great numbers were sent into other countries; but they came short of the beauty of those of the ancients, especially
Engraving, chiefly those on precious stones; for, as to those on crystal, the Germans, and, after their example, the French, &c. have succeeded well enough.

In this branch of engraving, they make use either of the diamond or of emery.

The diamond, which is the hardest of all stones, is only cut by itself, or with its own matter. The first thing to be done in this branch of engraving is, to cement two rough diamond points together, to hold them steady in the hand, and to rub or grind them against each other till they be brought to the form desired. The dust or powder that is rubbed off serves afterwards to polish them, which is performed with a kind of mill that turns a wheel of soft iron. The diamond is fixed in a brass dish; and, thus applied to the wheel, is covered with diamond dust, mixed up with oil of olive; and when the diamond is to be cut facet-wise, they apply first one face, then another, to the wheel. Rubies, sapphires, and topazes, are cut and formed the same way on a copper wheel, and polished with tripoli diluted in water. As to agates, amethysts, emeralds, hyacinths, garnets, rubies, and others of the softer stones, cut on a leaden wheel, moistened with emery and water, and polished with tripoli on a pewter wheel. Lapis-lazuli, opal, &c. are polished on a wooden wheel.

To fashion and engrave vases of agate, crystal, lapis-lazuli, or the like, they make use of a kind of lathe, like that used by pewterers, to hold the vesseis, which are to be wrought with proper tools: that of the engraver generally holds the tools, which are turned by a wheel; and the vesseis is held to them to be cut and engraved, either in relief or otherwise; the tools being moistened from time to time with diamond dust and oil, or at least emery and water. To engrave figures or devices on any of these stones, when polished, such as medals, seals, &c. they use a little iron wheel, the ends of whose axis are received within two pieces of iron, placed upright, as in the turner's lathe; and to be brought closer, or set further apart, at pleasure; at one end of the axis are fitted the proper tools, being kept tight by a screw.

Lastly, The wheels turned by the foot, and the stone applied by the hand to the tool, and is thifted and conducted as occasion requires.

The tools are generally of iron, and sometimes of brass; their form is various, but it generally bears some resemblance to chifels, gouges, &c. Some have small round heads, like buttons, others like fenders, to take the pieces out, and others flat, &c. When the stone has been engraved, it is polished on wheels of hair-brushes and tripoli.

Engaving on Steel, is chiefly employed in cutting seals, punches, matrices and dies, proper for striking coins, medals, and counters. The method of engraving with the instruments, &c. is the same for coins as for medals and counters: All the difference consists in their greater or less relief; the relief of coins being much less considerable than that of medals, and that of counters still less than that of coins.

Engravers in steel commonly begin with punches, which are in relief, and serve for making the creux or cavities of the matrices and dies: though sometimes they begin with the creux or hollows only: but then it is only when the intended work is to be cut very shallow. The first thing done, is that of designing the figures; the next is the moulding them in wax, of the size and depth they are to lie, and from this wax the punch is engraved. When the punch is finished, they give it a very high temper, that it may the better bear the blows of the hammer with which it is struck to give the impression to the matrix.

The steel is made hot to soften it, that it may the more readily take the impression of the punch; and after striking the punch on it in this state, they proceed to touch up or finish the strokes and lines, where by reason of their fineness or the too great relief they are anything defective, with steel gravers of different kinds, chifels, flatters, &c. being the principal instruments used in graving on steel.

The figure being thus finished, they proceed to engrave the rest of the metal, as the mouldings of the border, the engraved ring, letters, &c. with little steel punches, well tempered, and very sharp.

Engricbe, in heraldry, is said of the great mouth of a hunting horn, when its rim is of a different colour from that of the horn itself.

Enharmonic, in music. The Greeks had three different species of music, the diatonic, the chromatic, and the enharmonic. This last was esteemed by much the most agreeable and powerful of the three; but the difficulty of its execution rendered its duration short, and latter artists were upbraided for having sacrificed it to their indolence. It proceeded upon lesser intervals than either the diatonic or chromatic; and as the chromatic fret was still less than the diatonic, the enharmonic intervals must have consisted of that semitone divided into parts more minute. In Rouleau's Musical Dictionary (at the word Enharmonique), the reader may see how that interval was found in the trichords of the ancients. It is by no means easy for modern cars, inured to intervals so widely different, to imagine how a piece of music, whose transitions were formed either chiefly or solely upon such minute divisions, could have such wonderful effects; yet the melody of speech, which rises or falls by intervals still more minute than the enharmonic, when properly modulated and applied with taste, has an astonishing power over the soul. As to the modern enharmonic system, we may likewise refer the reader to the same work for an account of its nature and use; though he will find it accurately and clearly explained by D'Alembert, in the treatise of Music given in the present work, (art. 144. 145. 146.)

Enhydrus, in natural history, a genus of fide-rochta, or cratulated ferruginous bodies, formed in large and in great part empty cafes, inclining a small quantity of an aqueous fluid.

Of this genus there are only two species: 1. The thick-hulled enhydrus, with black, reddish-brown, and yellow crusts. 2. The thinner-hulled kind, with yellowish-brown and purple crusts; neither of which ferment with aquafortis or gives fire with steel.

Enigma. See Enigma.

Enixum, among chemists, a kind of natural salt, generated of an acid and alkali.

The salt enixum of Paracelsus, is the caput mortuum of spirits of nitre with oil of vitriol, or what remains in the retort after the distillation of this spirit; being of a white colour, and pleasing acid taste.
ENMANCHE', in heraldry, is when lines are drawn from the centre of the upper edge of the chief to the sides, to about half the breadth of the chief; signifying sleeve, or resembling a sleeve, from the French nameche.

ENNA, (anc. geog.), a town of Sicily, situated on an eminence to the south of the Chrysis; called the centre of Sicily. It was famous for a sacred grove, in which the rape of Proserpina happened; for a temple of Ceres, thence furnamed Ennea, and Ennecis; and for fine springs, whence the name (Bochart.)

ENNAGON, in geometry, a polygon with nine sides. See Polygon.

ENNEAHEDRIA, in natural history, a genus of columnar, crystalliform, and double-pointed spars, composed of a trigonal column, terminated at each end by a trigonal pyramid.

Of this genus there are several species, distinguished by the length or shortness of the column and pyramids, none of which give fire with steel, but all of them ferment with aquafortis. See Spar.

ENNEANDRIA, in botany, (from one, nine, and sp., a man or husband), the name of the ninth class in Linnaeus's system, consisting of plants which have hermaphrodite flowers with nine filaments or male organs. See Botany, p. 450. the Scheme.

ENNUS (Quintus), an ancient Latin poet, born at Rudii, a town in Calabria. He came first to Rome when M. Porcius Cato was quaestor, whom he had instructed in the Greek language in Sardium; and by his genius and behaviour he gained the esteem of the most eminent personages in the city. According to Horace, Ennius never applied himself to writing till he had drank freely of wine. Hence he contrived the gout, of which he died nine years B. C. He was interred in Scipio's sepulchre; who had a great esteem for him, and caused a statue to be erected to him upon his monument. He endeavoured to introduce the treasures of the Greek tongue among the Latins, and was the first among the Romans who made use of heroic verses. He wrote the Annals of Rome; he translated several tragedies from the Greeks, and wrote others, besides several comedies. We have only some fragments of his works, which were first collected by the two Stephens, and afterwards published at Naples, with a learned commentary, by Jeron Columna, in quarto, 1590; and reprinted at Amsterdam in 1707, in quarto, with additions by Heffelins.

ENOCH, the son of Cain (Gen. iv. 17.), in honour of whom the first city taken notice of in scripture was called Enoch by his father Cain, who built it. It was situated to the east of the province of Eden.

Enoch, the son of Jared and father of Methuselah, was born in the year of the world 622. At the age of 65 he began Methuselah, and lived 369 years after, and had several sons and daughters. Enoch walked with God; and after that he had lived in all 365 years, "he was not, for God took him.

Some confuse the last words, as if they intimated that Enoch died a natural death, because in reality he lived not near so long as the other patriarchs of those times; as if God, to secure him from corruption, had been pleased to take him early out of this world. But the generality of the fathers and commentators affect that he died not, but was translated out of the sight of men, in like manner as Elijah was. The apostle Paul (Heb. xi. 5) shows very clearly that Enoch was translated, and did not die.

The apostle Jude (ver. 14, 15.) cites a passage from the book of Enoch, which has very much exerected interpreters. The question is, whether the apostle took this passage out of any particular book written by Enoch, which might be extant in the first ages of the church? whether he received it by tradition for laity, by some particular revelation? It is thought probable, that he read it in the book we have been speaking of, which, tho' apocryphal, might contain several truths that St Jude, who was favoured with a supernatural degree of understanding, might make use of to the edification of the faithful.

The ancients greatly esteemed the prophecy of Enoch. Terrullian expresses his concert, that it was not generally received in the world. That father, on the authority of this book, deduces the original of idolatry, astrology, and unlawful arts, from the revoluted angels, who married with the daughters of men. St Auguflin allows indeed that Enoch wrote something divine, because he is cited by St Jude; but he says it was not without reason that this book was not inserted in the canon which was preferred in the temple at Jerusalem. This father sufficiently intimates, that the authority of this book is doubtful, and that it cannot be proved that it was really written by Enoch. Indeed the account it gives of giants engendered by angels, and not by men, has manifestly the air of a fable, and the most judicious critics believe it ought not to be ascribed to Enoch.

This apocryphal book lay a long time buried in darkness, till the learned Joseph Scaliger recovered a part of it. Scaliger, Volatus, and other learned men, attribute this work to one of those Scaligers who lived between the time of the Babylonish captivity, and that of Jesus Christ. Others are of opinion, that it was written after the rise and establishment of Christianity, by one of those fanatics with whom the primitive church was filled, who made a ridiculous mixture of the Platonic philosophy and the Christian divinity.

The eastern people, who call Enoch by the name of Edris, believe that he received from God the gift of wisdom and knowledge; and that God sent him 30 volumes from heaven, filled with all the secrets of the most mysterious sciences. The rabbins maintain, that when Enoch was translated to heaven, he was admitted into the number of the angels, and is the person generally known by the name of Michael.

ENORMOUS, something excessive or monstrous, especially in bulk.—The word is formed of the privatis e, and norma, "rule," q d. void of, or contrary to, rule or measure; contra normam. In the corrupt ages of Latinity, they used inornatis, and inornatis.

In the French jurisprudence, leste enornis, "enormous damage," is that which exceeds half the value of the thing.fold.

ENOS, the son of Seth and father of Caiman, was born in the year of the world 235. Moses tells us (Gen. iv. 26.), that then "men began to call upon the name of the Lord;" or, as others translate it, that "Enos began to call upon the name of the Lord," that is to say, that he was the inventor of religious
religious rites and ceremonies in the external worship which was paid to God. This worship was kept up and preferred in Enos’s family, while Cain’s family was plunged in all manner of irregularities and impieties. Several Jews are of opinion, that idolatry was at first introduced into the world in the time of Enos. They translate the Hebrew thus, “Then men began to profane the name of the Lord.”

Good men, to distinguish themselves from the wicked, began to take upon them the quality of sons or servants of God; for which reason, Moses (Gen. vi. 1, 2) says, that the sons of God (that is to say, the descendants of Enos, who had hitherto preferred the true religion), seeing the daughters of men, that they were fair, took them wives of all which they chose. Enos died at the age of 905 years, in the year of the world 1440.

ENS, among metaphysicians, denotes entity, being, or existence: this the schools call ens reale, and ens positivum; to distinguish it from their ens rationis, which is only an imaginary thing, or exilits but in the imagination.

ENS, among chemists, imports the power, virtue and efficacy, which certain substances exert upon our bodies.

ENS, in geography, a city of Germany, situated at the confluence of the Danube and the river Ens, about 80 miles south of Vienna. E. Long. 14. 20. N. Lat. 48° 16′.

ENSAT.E, in botany (from ensis, “a sword”); the name of the fifth species in Linnaeus’s natural method, consisting of plants with sword-shaped leaves.* It contains the following genera, viz. Antholyza, Callisia, Commelina, Crucus, Eriocaulon, Ferraria, Gladiolus, Iris, Ixia, Moraea, Pontederia, Sifyrinchium, Tradescantia, Wachendorffia, Xyris.

ENSEELED, in falconry, is laid of a hawk that has a thread drawn through her upper eye-lid, and made fast under her beak, to take away the sight.

ENSEMBLE, a French term, sometimes used in our language; literally signifying together, or one with another:—being formed from the Latin in and simul.

In architecture, we say the ensemble, or tout ensemble, of a building; meaning the whole work, or composition, considered together, and not in parts; and sometimes also, the relative proportion of the parts to the whole.—all those pieces of building make a fine ensemble.

To judge well of a work, a statue, or other piece of sculpture, one must first examine whether the ensemble be good. The tout ensemble of a painting, is that harmony which results from the distribution of the several objects or figures whereof it is composed.—“This picture is good, taking the parts separately; but the tout ensemble is bad.”

ENSIFORMIS CARTILAGO. See XIPHOIDES.

ENSIGN, in the military art, a banner of colours under which soldiers are ranged, according to the different companies or parties they belong to. See FLAG, COLOURS, STANDARD, &c.

The Turkish ensigns are horses tails; those of the Egyptians, of gold and silver, with divers figures, colours, arms, and devices thereon. Xenophon tells us, that the ensign borne by the Persians was a golden eagle on a white flag; the Corinthians bore the winged horse, or Pegalis, in theirs; the Athenians, an owl; the Medesians, the Greek letter Μ; the Lacedaemonians, the Α. The Romans had a great diversity of ensigns; the wolf, minotaur, horse, bow, and at length the eagle, where they toppled; this was first affixed in the second year of the confulate of Marius. A military ensign on a medal of a Roman colony, denotes it a colony peopleed with old soldiers.

ENSIGN is also the officer that carries the colours, being the lowest commissioned officer in a company of foot subordinate to the captain and lieutenant. It is a very honourable and proper post for a young gentleman at his first coming into the army; he is to carry the colours both in assault, day of battle, &c. and should not quit them but with his life; he is always to carry them himself on his left shoulder: only on a march he may have them carried by a soldier. If the ensign is killed, the captain is to carry the colours in his stead.

Naval ENSIGN, a large standard or banner hoisted on a long pole erected over the poop, and called the ensign flag.—The ensign flag distinguishes the ships of different nations from each other, as also to characterize the different squadrons of the navy. The British ensign in ships of war is known by a double cross, viz. that of St George and St Andrew, formed upon a field which is either red, white, or blue.

ENSISHEIM, a town of France, in Upper Al- face. It is a pretty little place, well built, and consists of about 200 houses. E. Long. 7. 41. N. Lat. 47° 49′.

ENT (Sir George), an eminent English physician, born at Sandwich in Kent in 1604. He was educated at Sidney college, Cambridge; and, afterwards travelling into foreign countries, received the degree of doctor of physic at Padua. After his return he obtained great practice, was made president of the college of physicians in London, and at length received the honour of knighthood from King Charles II. He was extremely intimate with Doctor Harvey; whom he learnedly defended in a piece intituled, Apologia pro Circulazione Sanguinis, contra Eamilium Parijaenum. He also published, Animadversiones in Malachia Thrusonii; and some observations in the Philosophical Transactions. Glanville, speaking of his Plus Ultra of the modern improvements in anatomy, numbers Sir George Ent, Doctor Cilifon, and Doctor Wallis, with the most celebrated discoverers in that science. The two former were among the first members of the Royal Society. Sir George Ent died in October 1689.

ENTABLATURE, or ENTASSEMENT, in architecture, is that part of an order of a column which is over the capital, and comprehends the architrave, frieze, and cornice. See ARCHITECTURE, chap. i.

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ENTabler, in the manage, the fault of a horse whose croup goes before his shoulders in working upon heavy work, which may be prevented by taking hold of the right rein, keeping your right leg near, and removing your left leg as far from the horse’s shoulder as possible.

This is always accompanied with another fault called sticker. See ACCELER.

ENTAIL, in law, signifies entail, or see entail; that is, abridged, curtailed, or limited, to certain conditions. See FEE, and TAIL.

ENTE, in heraldry, a method of marshalling, very frequent
ENTOMOLOGY.

The science of insects, or that part of zoology which treats of insects.

By some natural historians, this class of animals is considered as the most imperfect of any, while others prefer them to the large animals. One mark of their imperfection is said to be, that many of them can live a long time, though deprived of those organs which are necessary to life in the higher ranks of nature. Many of them are furnished with lungs and an heart, like the nobler animals; yet the caterpillar continues to live, though its heart and lungs, which is often the case, are entirely eaten away. It is not, however, from their conformation alone that insects are inferior to other animals, but from their instincts also. It is true, that the ant and the bee present us with striking instances of industry; yet even they are inferior to the marks of agility displayed by the larger animals. A bee taken from the swarm is totally helpless and inanimate, incapable of giving the smallest variations to its instincts. It has but one single method of operating; and if put from that, it can turn to no other. In the pursuits of the hound, there is something like choice; but in the labours of the bee, men being most forwardly obedient to the impulses they receive from themselves. Devotion, when it does not lie under the check of reason, is apt to degenerate into xenusiasm. When the mind is inflamed with devotion, it is apt to think that it is not of its own kindling, but blown up with something divine within it. If the mind indulges this thought too far, and humours the growing passion, it at last flings itself into imaginary raptures and ecstasies; and when once it fancies itself under the influence of a divine impulse, no wonder if it flings human ordinances, and refuses to comply with the established form of religion, as thinking itself directed by a much superior guide.

ENTHUSIASM, a person possessed with enthusiasm. See the preceding article.

ENTHUYMEME, in logic and rhetoric, an argument consisting only of two propositions, an antecedent, and a consequent deduced from it. The word is Greek, ἐνθύμημα, formed of the verb ἐνθύμησαι, "to think, conceive," a compound of ἐν and θύμης, "mind."

The enthymeme is the most simple and elegant of all argumentations; being what a man, in arguing closely, commonly makes, without attending at all to the form. Thus, that verse remaining of Ovid's tragedy, intitled Medea, contains an enthymeme; Servare pointi, perdere an opus meum; "I was able to save you consequently to have defroed you." All the beauty would have been lost, had all the propositions been expressed; the mind is displeased with a rehearsal of what is no ways necessary.

Sometimes, also, the two propositions of an enthymeme are both included in a single proposition, which Aristotle calls an enthymematrical sentence, and gives this instance thereof: Mortal, do not hear an immortal hatred. The whole enthymeme would be, Thou art mortal; let not therefore thy hatred be immortal.

ENTITY, the same with EN. 

There is, indeed, one instance of enté in the fourth grand quarter of the British royal ensign, whose blazon is Brunswick and Lunenburg impaled with ancient Saxony enté en pointe, "granted in point." ENTEROCELE, in surgery, a tumor formed by a prolapsus of the intestines through the rings of the abdomen and procociles of the peritoneum, into the scrotum. See Surgery.

ENTHUSIASM, an ecstacy of the mind, whereby it is led to think and imagine things in a sublime, surprising, yet probable manner. This is the enthusiasm felt in poetry, oratory, music, painting, sculpture, &c.

Enthusiasm, in a religious sense, implies a transport of the mind, whereby it fancies itself inspired with some revelation, impulse, &c., from heaven. Mr. Locke gives the following description of enthusiasm. "In all ages, men in whom melancholy has mixed with devotion, or who conceit of themseleves is raised to an opinion of a great familiarity with God, and a nearer admiration to his favour than is afforded to others, have often flattered themselves with a persuasion of an immediate intercourse with the Deity, and frequent communications from the Divine Spirit. Their minds being thus prepared, whatever groundless opinion comes to settle itself with force in poetry, oratory, and when once it gets footing, it is not, however, without attending at all to the form. Thus, that verse remaining of Ovid's tragedy, intitled Medea, contains an enthymeme; Servare pointi, perdere an opus meum; "I was able to save you consequently to have defroed you." All the beauty would have been lost, had all the propositions been expressed; the mind is displeased with a rehearsal of what is no ways necessary.

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youth, vigour, and age, in the space of a few days existence.—In Lapland, and some parts of America, the insects are so numerous, that if a candle is lighted there for some days, it is instantly extinguished by them; and in these parts of the world, the miserable inhabitants are forced to smear their bodies and faces with tar, or some other unctuous composition, to protect them from the stings of their minute enemies.

On the other hand, Swammerdam argues for the perfection of insects in the following manner. "After an attentive examination (says he) of the nature and anatomy of the smallest as well as the largest animals, I cannot help allowing the least an equal, or perhaps a superior, degree of dignity. If, while we differ with care the larger animals, we are filled with wonder at the elegant disposition of their parts, to what an height is our astonishment raised, when we discover all these parts arranged, in the leaf, in the same regular manner! Notwithstanding the smallest of ants, nothing hinders our preferring them to the largest animals, if we consider either their unwearying diligence, their wonderful strength, or their inimitable propensity to labour. Their amazing love to their young is still more unparalleled among the larger classes. They not only daily carry them to such places as may afford them food; but if by accident they are killed, and even cut into pieces, they will with the utmost tenderness carry them away piece-meal in their arms. Who can show such an example among the larger animals which are dignified with the title of perfect? Who can find an instance in any other creature that can come in competition with this?"

On this dispute it is only necessary to observe, that the wisdom of the Creator is so conspicuous in all his works, and such surprising art is discovered in the mechanism of the body of every creature, that it is very difficult, if not impossible, to say where it is most, and where it is least, to be observed.

Whoever is desirous of attaining a systematic knowledge of insects, ought primarily to be solicitous about acquiring the terms made use of in the science, that so he may be able rightly to denominate every part of an insect. The student is first to know what an insect is, left he mistake hippocampi, and other amphibious animals, for them, as was formerly done; or confound them with the vermes, which Linneus first distinguished from insects, and which differ as essentially from them as the class mammalia do from birds. Every insect is furnished with a head, antennae, and feet, of all which the vermes are destitute. All insects have six or more feet; they require through pores placed on the sides of their bodies, and which are termed spiracae; their skin is extremely hard, and serves them instead of bones, of which they have internally none. From this definition, the acus marina is evidently no insect. But the antennae placed on the fore part of the head, constitute the principal distinction. Those are jointed and moveable in every part, in which they differ from the horns of other animals: they are organs conveying some kind of sense; but we have no more idea of what kind of sense is, than a man has, who, without eyes, attempts to determine the particular action of the rays of light on the retina of the eye, or to explain the changes which from thence take place in the human mind. That they are the organs of some kind of sense, is apparent from their perpetually moving, forward; yet the hard crust with which they are invested, and their shortness in flies and other insects, would induce one to believe one of the organs of touch; Mr. Barbut supposes them to constitute or to contain the organs of hearing. That they are tubular, and filled with air, and some kind of humour, appears from the antennæ of butterflies immersed in water.—To come now to the terms of the art. A knowledge of the external parts of the body is first to be established; which, after the method of anatomists, we divide into head, trunk, abdomen and extremities.

I. CAPUT, THE HEAD. This part in insects is without brain. The difference between the brain and spinal marrow consists in the former being a medullary part organized. We do not deny the existence of a medullary thread in the heads of insects, but we never could doubt it to be organized: hence the hippocoequa, or horfe fly, will live, run, nay even copulate, after being deprived of its head; to say nothing of many others which are capable of living a long while in the same situation.

As they are not apparently furnished with ears, they have been apprehended incapable of hearing; as we can no more conceive that sense to exist without ears than vision without eyes. That they are nevertheless susceptible of any shrill or loud noise, as well as fishes, is indubitable; but it has been supposed to be in a manner different from that of hearing. Mr. Barbut, however, supposes them to possess this sense in a very distinct manner. Many insects, he observes, are well known to be endowed with the power of uttering sounds, such as large beetles, the bee, wasp, common fly, gnat, &c. The sphinx atropos squeaks, when hurt, nearly as loud as a mouse. Now, if insects are endowed with the power of uttering sounds, it certainly must be for some purpose. As they vary their cry occasionally, it must certainly be designed either to give notice of pleasure or pain, or some affection in the creature who possesses it. "The knowledge of their sounds, (says our author) is undoubtedly confined to their tribe, and is a language intelligible to them only; saving when violence obliges the animal to exert the voice of nature in distress, crying compation; then all animals understand the doleful cry. For instance, attack a bee or wasp near the hive or nest, or a few of them: the consequence of that assault will be, the animal or animals, by a different tone of voice, will express his or their disapprobation or pain; that sound is known to the hive to be plaintive, and that their brother or brethren require their assistance; and the offending party seldom escapes with impunity. Now, if they had not the sense of hearing, they could not have known the danger their brother or brethren were in by the alteration of their tone."

Another proof, which he reckons still more decisive, was taken from an observation made by himself on a large spider in St. James's Park. This creature had made a very large web on a wooden railing; and was, at the time of observation, on one of the rails at a considerable distance from the place where a large fly enlan-
EN TOMOLOGY.

Scot. I.

Organs of hearing, &c.

Nevertheles, the moment the fly was entangled, the spider became sensible of it; tho', from the situation of the rail, he could not possibly have seen it. In this, however, Mr Barbut might possibly be deceived; because the spider was perhaps alarmed by the tremulous motion of the threads, occasioned by the fluttering of the fly; which he might well know how to distinguish from their vibration by the wind. The organ of hearing, in our author's opinion, is situated in the antennae; both from their situation in the part of the head most favorable to such organs, their inward structure being moveable, the ears of most inferior animals being so. He has never considered the antennae as either offensive or defensive, but has observed them to be endowed with an exquisite sense of feeling; that the animal appeared to be in agony when its antennae were pinched; and that it takes care to avoid the touching any hard substance with them roughly. "This tenderness in the organ of hearing (says he) is common to all animals; and infects seem to be particularly tender in these parts by sickle-hooks of the fly, drawing close to them.

Our author further observes, that the antennae of all insects are composed of joints varying in size, form, and number. Those who are chiefly confined to live under water have their antennae in general shorter than those who live on land. Some who roam at large in the air have them long and slender. They are all hollow, and are rendered flexible by the joints, which are very visible in the horns of the crab and lobster. This hollowness, in our author's opinion, is to receive the sound communicated to the extremities of the antennae by the repercussion of the air affected by any noise, and convey it by means of joints, from one to another, till it arrives in that softened degree of tone suited to the timid nature of the animal. In this circumstance there may be many variations in point of perfection in these organs; the strength, utility, and degree of power in receiving found being proportioned to the necessities of the animals, different in their nature and requisites. In most animals, the entrance to the auricular organ is patent; but in this case the animal would suffer great inconvenience from such an organization, as the organ would often be clogged with dirt, &c.

It has also appeared dubious if they have the sense of smell, no organ being found in them adapted to that purpose; and although it was evident they had a perception of agreeable and fetid effluvia, it was thought to be in a manner altogether unknown to us. Mr Barbut is of opinion that the organs of smell reside in the palpi or feeler. Many insects have four and some fix, two of which are in general cheliform, in order to assist the insect in conveying its food to its mouth. It may be likewise observed, that the palpi are in continual motion; the animal thrusting them into every kind of putrid and other matter, as a hog would do his nose, finelling and searching after food. Insects which apparently do not possess palpi or spiral tongues, have undoubtedly some organ concealed within the mouth analogous to them in function and utility. The head of the fly is then the organ from which the animal expects to find food; and when it is extended, nearly in the middle are situated, in our author's opinion, two upright palpi, which, no doubt, perform in their turn some office, perhaps that of smell.

Many insects have no tongue, nor make any found with their mouth; but for this purpose some use their feet, others their wings, and others some elastic instrument with which they are naturally furnished.

Eyes. Most insects have two; but the gyraeus has four; the scorpion six, the spider eight, and the scelepandra three. They have no eye-brows, but the external tunic of their eyes is hard and transparent like a watch-glass; their eyes have no external motion, unless it be in the crab. They consist for the most part of one lens only: but in those of the butterfly, diptræ, and many of the beetles, they are more numerous.

Pugett discovered 17,325 lenses in the cornea of a butterfly, and Lieuwenhoek 800 in a fly.

Antennæ. Of these there are in general two (unless four are allowed to some kind of crabs), and placed on the forepart of the head: they are peculiar to insects; and are plainly distinguishable from the tenaculum of the vernes, in being crustaceous; and from the palpi of insects, which are more numerous, placed near the mouth, and are sometimes wanting. As the antennæ are of great moment in distinguishing the various kinds of insect, we shall enumerate and explain the several different forms of them.

Setaceous, are those which grow gradually taper towards the extremity.

Filiformes, such as are of the same thickness throughout.

Moniliformes, are filiform, like the preceding, but consist of a series of round knobs, like a necklace of beads.

Clavate, such as gradually increase in size toward the extremity.

Capitate, are clavate, but have the extremity somewhat round.

Fimbriæ, are capitate; but have the capitulum, or knob, divided longitudinally into three or four parts, or laminae, as in the scarabæi.

Perfoliatae, are also capitate; but have the capitulum horizontally divided, as in the dermestes.

Podiatae, so called from their similitude to a comb, though they more properly resemble a feather, as in the moths and catterachers. This is most obvious in the male.

Aristata, such as have a lateral hair, which is either naked or furnished with softer hairs, as in the fly; Brevirostis, those which are shorter than the body; longirostis, those which are longer than the body; mediores, those which are of the same length with the body; all three of which varieties are distinguishable in the cerambecas.

Palpi, or Feelers, resemble filiform, articulated, moveable antennæ. They are most commonly four in number, sometimes six; they are sufficiently distinguishable from antennæ, in being naked, short, and always placed at the mouth.

Os, the Mouth, is generally placed in the anterior part of the head, extending somewhat downwards. In some insects it is placed under the breast, as in the chernen, cocccus, cancer, (crab), and curculio.

Rostrum, or Proboscis, is the mouth drawn out to a rigid point: in many of the hemiptera clas it is bent downward toward the breast and belly, as in the cicada,
Entomology.

Organs of cicada, nepa, notonecta, cinex (bug), aphid, and hearing, &c. remarkable so in some curculionidae.

Maxillae, the jaws, are two in number, sometimes four and at times more; they are placed horizontally; the inner edge of them in some insects is serrated or furnished with little teeth.

Lingua, the tongue, in some insects is taper and spiral, as in the butterfly; in others it is fleshy, resembling a proboscis, and tubular, as in the fly.

Labium superior, the upper lip, is situated above the jaws; as in the scarabaeus and gryllus.

Stemmata, or Crown, are three smooth hemispheric dots, placed generally on the top of the head; as in most of the hymenoptera, and others.

II. Truncus, the Trunk, is that part which comprehends the breast or thorax: it is situated between the head and abdomen; and has the legs inserted into it. That its parts may be distinctively determined, it is divided into thorax, scutellum, and sternum.

Thorax, the thorax, is the back part of the breast; and is very various in its shape. It is called dentatus, when its sides are armed with points; spinosus, when its back is furnished with them, as in the cerambyx; and marginatus, when its margin is laterally dilated, as in the alpaca and cattida.

Scutellum, or Efixecheum, is the posterior part of the thorax; it is frequently triangular; and appears to be divided from the thorax by an intervening future, as in most of the coleoptera.

Sternum, the Sternum, is situated on the inferior part of the thorax; it is pointed behind in the elaters, and bifid in some of the dyptera.

III. Abdomen, the Abdomen is in most insects distinct from the thorax; it is the posterior part of the body of the insect; and is composed of a number of annular segments, which serve occasionally to lengthen or shorten it, and to contain the organs of chylification, &c.

Teraculum, the little holes or pores, placed singly on each side of every segment of the abdomen: thro' these the insect breathes: and if oil be applied so as to stop them up, it proves fatal to most of them.

Tergum, the Back, is the superior part of the abdomen.

Venter, the Belly, is the inferior part.

Anus, is the posterior part of the abdomen, perforated for the evacuation of the excrement. This part also frequently contains the organs of generation.

IV. Artus, the Limbs or Extremities, are the various instruments of motion.

Pedes, the Legs, are generally fix. There is an exception to this, however, in the class Aptera, many of which have eight; as acari (mites), philangi, most of the arachni (lippers), scorpiones (scorpions), and cancri (crabs). The onicas has 14, and the iulii and sculpoida 20 more.

The first joint of the leg, which is generally thickest, is called femur; the second, which is generally of the same size throughout, tibia; the third, which is joined, is distinguished by the name of tarsus; and the last, which in most insects is double, by that of claws, &c. unguis. The legs of insects, in general, are named from the various motions they produce: Carro, from that of running, which are the most numerous; saltatorii, from that of leaping;Natatorii, from that of swimming, &c.—In the saltatorii, the feet are flat, and edged with hairs, which answer the purpose of oars in affilling them to swim, as in the dyptera.—Mutict, are such feet as have no claws.

—Cocle, or claws, are the fore-feet enlarged towards their extremities, each of which is furnished with two lesser claws, which act like a thumb and finger: as in the crab.

Ars, Wings, the instruments which enable them to fly. These are membranous and undivided, except in the instance of the phalaenae alatae, in which they are in part divided. Most insects have four; the diphila-clads, and the coccus, however, have two only.

The wing is divided into its superior and inferior surfaces: its anterior part in a butterfly, is that towards the anterior margin, or next to the head; its posterior part, that towards the anus; its exterior part that towards the outer edge; and the interior, that next the abdomen.

They are called plicatiles, when they are folded at the time the insect is at rest, as in the wasp; opposite to these are the plana, which are incapable of being folded.

Erelae, such as have their superior surfaces brought in contact when the insect is at rest; as in the ephe- mera, libellula puella and virgo, and papiliones (butterflies).

Patentes, which remain horizontally extended when the insect is at rest; as in the phalaenae geometrae, and most of the libellulae.

Incumbentes, such as cover horizontally the superior part of the abdomen when the insect is at rest.

Deflexae, are incumbent, but not horizontally, the outer edges declining toward the fides.

Reversae, are deflexae, with this addition, that the edge of the inferior wings projects from under the anterior part of the superior ones.

Dentata, in which the edge is serrated, or scoloped.

Caudata, in which one or more projections in the hinder wings are extended into processes.

Reticulate, when the vessels of the wings put on the appearance of network, as in the hemerobius perla; the two anterior wings generally become superior, and the posteriores inferior, in moths, when their wings are closed; but the anterior wings are called primary, and the inferior ones secondary, in butterflies, as they cannot with propriety be called inferior when the wings are croft.

Colores, the colours, these are self-apparent: but according to their several shapes, they take the different names of puniceae, dots; maculeae, spots; suffiae, bands, which frequently run across and sometimes surround the edge of the wings; frigae, streaks, which are very slender suffiae; and lineae, lines, which are longitudinally extended.

4 Q  Ocellus,
ENTOMOLOGY.

2. Antennæ perforates, or perforated; as of the sexes in the dermestes and dysisius.
3. Fissiles, or filile, divided into laminae at the extremity; as in the scarabæi, beetles.
4. Clavate, or club-shaped, as in the papilio, butterfly.
5. Moniliformes, like a necklace of beads; as in the chrysomela.
7. Aristate, furnished with a lateral hair, as in the fly.
8. a Caput, the head. 
b Palpi, or feelers. 
c Antennæ, or horns. 
d Oculi, the eyes. 
e Thorax. 
f Scutellum, or eucnichicon. 
g Pectus, or breast. 
h Sternum, or breast-bone. 
i Abdomen, and its segments. 
j Anns. 
k Elytra, or shells. 
l Membranous wings. 
m Pedes, or feet, which are natatorii.
10. o Femur, or thigh. 
p Tibia, or leg. 
q Tarus, or foot. 
r Unguis, or claw.
11. a The anterior part of the wing. 
b The posterior part. 
c The exterior part. 
d The interior part. 
e The margin. 
f The disk, or middle. 
g Oculus, or eye.
12, 13, 14, 15, Represent the insect in its egg; caterpillar, pupa, and perfect state.

SECT. II. Of the Sexes of Insects.

The same difference of sex exists in insects as in other animals; and they even appear more disposed to increase their species than other animals; many of them, when become perfect, seeming to be created for no other purpose but to propagate their species; thus the silk-worm, when it arrives at its perfect or moth-state, is incapable of eating, and can hardly fly: it endeavours only to propagate its species; after which the male immediately dies, and the female as soon as she has deposited her eggs.

In many insects, the male and female are with difficulty distinguished; and in some they differ so widely, that an unskilful person might easily take the male and female of the same insect for different species; as for instance, in the phaëna hurnuli, piniaria, rubrula; each sex of which differs in colour. This unlikelihood is still more apparent in some insects, in which the male has wings and the female none; as in the coccus, lampyrus, phaëna antiqua, brumata, lichenella. And as most insects remain a long while in copulation, as we may see in the tipula and silk-worm, the winged males fly with the wingless females, and carry them about from one place to another; as in the phaëna antiqua.
tiqua. It is, however, no certain rule, that when one inflect of the same species is found to have wings, and the other to be without, the former must necessarily be the male, and the latter the female. The aphides, for instance, are an exception; and besides these, individuals of both sexes, and of the same species, are found without wings, as the carabi majores, tenebromas, mel­loes, cinices. The gryllus pedestris is likewise deficient of wings; and might have passed for a gryllus in its pupa state, had it not been seen in copulation; for it is well known that no infect can propagate its species till it arrives at its last or perfect state.

"Pleraque insectorum genitalia sua intra anum habent abcondita, et penes solitarios, sed nonnulla penem habent bifiidum: Cancri autem et Apeari geminos, quedammodum nonnulla amphibia, et quod mirandum illum in France, sunt invelent." (Linnéus).

It differs from the male and female, a third sex exists in some insects which we call neuter: as these have not the distinguishing parts of either sex, they may be considered as caunuchs or infirile.

We know of no influence of this kind in any other class of animals, nor in vegetables, except in the class Syngenidae, and in the Opus. This kind of sex is only found among those insects which form themselves into societies, as bees, wasps, and ants: and here these kind of caunuchs are real slaves, as on them lies the whole busines of the economy; whilst those of the other sex are idle, only employing themselves in the increase of the family. Each family of Bees has one female only (called the queen), many males, and an almost innumerable quantity of neuters. Of those, the neuters (whose antennae have 11 joints) do the working part; they extract and collect honey and wax, build up the cells, keep watch, and do a variety of other things. The females consist of 15 joints do no work; they serve the female once, and that at the expense of their lives; they may be considered in the light of a set of parasites, or eunuchs; but as soon as their business of impregnation is over, they are expelled by their servants the neuters, who now take off the yoke, but yet pay all due respect to their common mother the queen. The same economy nearly takes place in Wapfs, where the young females, which are impregnated in the autumn, live through the winter, and in the spring propagate their species; but the queen, together with all the males, perish in the winter. Among Ants, the neuters form a hill in the shape of a cone, that the water may run off it, and place those which come upwards to defend that side of it which is least exposed to the heat of the sun. At a considerable distance from these are found the habitations of the males and females, to whom the most ready obedience is yielded by the neuters, till a new offspring succeeds, and then they oblige them to quit their habitation. But those ants which live entirely under ground provide better for themselves in this respect; for a little before their nuptials, they quit their habitation of their own accord, and after swarming in the manner of bees, they copulate in the air; and each retiring to some new habitation, founds a new family.

No hermaphrodites have as yet been discovered among insects. There is something very singular, however, in the propagation of the aphides. A female aphis once impregnated, can produce young, which will continue to produce others without any fresh impregnation, even to the fifth progeny; afterwards a new impregnation must take place. See Aphis.

The male insects, like male hawks, are always smaller than the females.

In the propagation of their species they are remarkably careful; so that it is with the greatest difficulty the flies are kept from depositing their eggs on fresh meat, the cabbage butterfly from laying them on cabbage, and other insects from depositing them in the several places peculiar to each. The scarabaeus pilarianus and carnisex are deferving of our attention, as they afford a mutual assistance to each other: for when the female has laid her eggs in a little ball of dung, the males with their feet, which are axiform, affist the female to roll it to some suitable place; as Arifotle and Pliny formerly, and Loefling has lately, observed.

It is very wonderful to observe, that in the coccus and onicus, the female has no foother brought forth her young, than she is devoured by it; and that the fphex should be able so readily to kill the caterpillar of a moth, then bury it in the earth, and there deposit her eggs in it. Nor can we without admiration behold the same species of aphis, which was viviparous in the summer, become oviparous in the autumn.

Almoft innumerable examples might be brought of the singularities in the eggs of insects: we shall, however, only mention those of the hemerobius, which are deposited on a footstalk; those of the phalæmæ neutria, which are placed regularly on a ring round the branch of some tree; and the compound eggs of the blatta.

Sect. III. Metamorphosis of Insects.

There are no insects, except those of the aptera classes, but what are continually undergoing some transformation. Insects change first from the (ovum) egg, into the (larva) caterpillar or maggot; then into the (pupa) chrysalis; and lastly into the (imagi) fly or perfect state. During each of these changes, their appearance differs as much as night and day.

The insect, as soon as it came out of the egg, was by former entomologists called erucæ; but as this is synonymous with the botanic name sisyphrium, it was changed by Linæus for the term Larva; a name expressive of the insect's being, in this state, as it were malked, having its true appearance concealed. Under this mask or skin the entire insect, such as it afterwards appears with its perfect lie concealed, enveloped only in its tender wings, and putting on a soft and pulpy appearance; insomuch that Swammerdam was able to demonstrate the butterfly with its wings to exist in a caterpillar, though
that had four wings, were called

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appearance also carried with it some mark of distinction:

so that entomologists called all those of the coleoptera

flies; that of the same classs that had four wings, were called Aper (bees). No

further progress was made in the systematic part of this science till the time of Linnæus. He was the first

that undertook to determine the genera, and align

them their proper characters, in the Systema Naturæ;

and thus reduced this science to a systematic form.

This system, in subsequent editions, was considerably

enriched and amended by him, inso much that the science

of insects now shines forth in its full luster. He it

was who first instituted natural orders, and reduced

them into genera by expressive names; determined an

infinite number of species in the Fauna Suecica and Mu-

seum Regnum; collected with incredible pains the synon-

ymous names of the various authors who had written

on them; and lastly added their descriptions, and the

places in which they were to be found. So that the

system of this illustrious author will lead any person,

without the assistance of a matter, for the most part,

easily to ascertain the name of any insect he may meet

with. Before his time scarce any more than 200 insects

were known; whereas, in the last edition of his

system he has determined the names of nearly 3000
different species; though this is not the sixth part of

the number that is now known.

Orders. The classs of insects is divided by Linnæus

into seven orders.

1. The Coleoptera (from κόλοπτερον, a floath, and ςιγμω νυ a

wing), are such insects as have crustaceous elytra or

shells, which shut together, and form a longitudinal

dowl the back of the insect; as the beetle (bu-

prolis ignis), fig. 16.

2. Hemiptera (from χείρ, hand, and ςιγμω νυ a wing),

have their upper wings usually half crustaceous and half

membranaceous, not divided by a longitudinal future,

but incumbent on each other; as the cicex, fig. 17.

3. Lepidoptera (from λεπίς a scale, and ςιγμω νυ a wing),

are insects having four wings, covered with fine scales.

in the form of powder or meal; as in the butterfly

(papilio antopa), fig. 18.

4. Neuroptera, (from νεύρα, a nerve, and ςιγμω νυ a wing),

have four membranous transparent naked wings, gen-

erally like net-work; as in the panoræa con, fig. 19.

5. Hymenoptera (from χυμέν a membranes, and ςιγμω νυ a

wing), are insects with four membranous wings, tail-

furnished with a sting; as in the tendrils, fig. 20.

6. Diptera (from δύο two, and ςιγμω νυ a wing), are such

as have only two wings, and poifers; as in the

fly (musca), fig. 21.

7. Apera (from α without, and ςιγμω νυ a wing), insects

having no wings. This last division contains

scorpions, spiders, crabs, lobsters, &c. see ARAEA.

Cancer, &c.

Genera. To infert here the characters of all the
different genera which may be found in Linnæus's Syll.

Nat. would be unnecessary. It will be sufficient
to enumerate some new genera mentioned by sub-
sequent systematic writers, that, by being acquainted

with the subtle distinctions on which they are built,

the student may avoid running into confusion. It is

among the moderns only that genera of this kind are

to be met with, and new names given them. To re-

move this difficulty, we shall first enumerate the names of
classsScarabæi (beetles); those of the lepidoptera

classification of insects. sect. iv.

classification of insects.

sects. IV.
ENTOMOLOGY.

Classification of insects.

New genera of authors synonymous with those of Linnaeus.

Linnaeus's Names. 

Lucanus. 
Haller. 
Byrrhus. 
Nylabris. 
Attelabus. 
Silpha. 
Bruchus. 
Ptinus. 
Chrysolomata. 
Hilpa. 
Cantharidis. 
Buprestis. 
Carabus. 
Myrmeleon. 
Sirce. 

Names of other Authors. 
Platyceps. 
Atalus. 
Anthemus cistela. 
Loricor Scop. 
Clerus. 
Vespa. 
Mylabris. 
Byrrhus. 
Galerula. 
Griferis. 
Cicindula. 
Cucujus. 
Dytiscus. 
Formicole. 

New genera of authors. 
Copris. 
Silpha. 
Mylabris. 
Cicindela. 
Cucujus. 
Hydrophilus. 
Diapedia.

Thus alfo, to mention no more, how needless and rash it was to separate the acidum and locusta from the genus of gryllus, the crabro from the tenthredines, and the mylabris from the neydyalis!

TRIVIAL NAMES. The trivial names placed under their respective genera will occasion little or no controversy; they are current like money, and of the same utility as the proper names of men, Peter or Paul. Insects living on vegetables should receive their names from the particular plants on which they mostly feed, as they are preferable to all others. Thus the names of the phalans mori, &c. are excellent; and when we are able to give such to insects, the old ones are to be discarded. But we are to be cautious of not being too hasty in our judgment in this respect; as insects, when they cannot get their favourite food, will often eat other plants. Thus the silk-worm, for want of mulberry leaves, will eat those of lettuce, though it will not thrive so well on them.

Many other instances of the invention of trivial names will be met with in the Systema Naturalis, particularly among the butterflies and moths. To prevent confusion from the great number of species which constitute the genus of phalans, they are distributed into sections, and distinguished by the terms of bombettes, nolius, geometra, tortricia, pyralides, linea, and alucites. The bombettes and nocula, which are so much alike, that the females of the bombettes are with great difficulty distinguished from the nocula, are named promiscuously.

All those of the geometrae have their names terminating in arid alia, according as their antennae are facetaceous or pectinated. The tortrices, in alia; the pyralides, in alia; the linea, in alia; and the alucites, in alia: so that it is evident from the termination itself to what section the insect is to be referred.

It was to be wished that similar institutions could be formed throughout the whole science, as here the name itself serves to distinguish the insect.

Butterflies are divided into sections, by the names of Equites, Helicatii, Danae, Nymphales, and Plebeii.

In such a multitude of butterflies, the greatest part of which are foreign and extra European, and to whose food and manner of life we are utter strangers, it was impossible to give significant trivial names. Linnaeus, therefore, by way of simile, has taken the names of the Equites from the Trojan history. These confilt, usually, of two troops of men, one of which, &c., contains the female, and as it was ornamenting nobles, having red or bloody spots at the basis of their wings.

They.
Thefe receive names from the Trojan nobles; and as Priam was king of Troy, the most splendid among these bear his name. The other body, ornamented with a variety of gay colours, are distinguished by the names of the Grecian heroes; and as in both armies there were kings as well as officers of an inferior rank, those elegant butterflies, whose hinder wings resembled tails, were distinguished by some royal name. Thus when Paris is mentioned (knowing from history that he was a Trojan, and of royal blood), we find him among those of the first section; that is, those of a fable colour, spotted in the breast with red, and having their hinder wings resembling tails. When Agamemnon is named, we remember him to be a noble Greek, and find him among those noble which have variegated and swallow-tailed wings. But when Nereus is spoken of, we readily know him to belong to the last section with wings having no tails.

The second class, which contains the Heliconi, derive their names from the muses, as Urania. The names of the sons and daughters of Danaus are distinguished on the third section. And as these species are subdivided into two other sections, viz. the white and parti-coloured, the metaphor is so conducted, that the white ones preserve the names of the daughters of Danaus, and the parti-coloured ones those of the sons of Egyptus: so that it is evident from the name itself to what section the butterfly is to be referred.

The names of the fourth section, Nymphales, are taken from various nymphs of antiquity; and those of the fifth section, Plebeii, are selected from different men among the ancients whose names are worthy of remembrance: so that by this means a knowledge of the ancients may be interperfed, and this agreeable science be made doubly pleasing.

Those, therefore, who shall find new lepidoptera, and give them new names, will do well to follow this method, unless it be apparent what food the insect chiefly subsists on.

ENTROCHUS, in natural history, a genus of extraneous fossils, usually of about an inch in length, and made up of a number of round joints, which, when separate and loose, are called trochites; they are composed of the same kind of plated spar with the fossil shells of the echinus, which is usually of a bluish-grey colour, and very bright where fresh-broken; they are all collected from the centre to the circumference, and have a cavity in the middle. See Plate CLXXXII.

The entrochi are found of all sizes, from that of a pin's head to a finger's length, and the thickness of one's middle finger; and are plainly of marine origin, having often fossil-shells adhering to them. They seem to be the petrified arms of that singular species of the sea-feather, called Stella arborescens.

They are esteemed very powerful diuretics, and prescribed in nephritic cases with great success; the dofe being as much of the powder as will lie on a billiard ball.

ENTRY, in law, signifies taking possession of lands or tenements, where a person has a right so to do.

Envoy of an Heir, in Scots law, that form of law by which an heir vesta in himself a proper title to his predecessor's estate.

Bill of Entry, in commerce. See Bill.

In making entries inwards in England, it is usual for merchants to include all the goods they have on board the same ship in one bill, tho' sometimes they may happen to be upwards of 20 several kinds: and in cafe the goods are short entered, additional or post entries are now allowed; though formerly the goods, so entered, were forfeited. As to bills of entry outwards, or including goods to be exported, upon delivering them, and paying the customs, you will receive a small piece of parchment called a cocket, which testifies your payment thereof, and all duties for such goods.

If several forts of goods are exported at once, of which some are free, and others pay customs; the exporter must have two cockets, and therefore must make two entries; one for the goods that pay, and the other for the goods that do not pay customs.

Entries of goods, on which a drawback is allowed, must likewise contain the name of the ship in which the goods were imported, the importer's name, and time of entry inwards. The entry being thus made, and an oath taken that the customs for those goods were paid as the law directs, you must carry it to the collector and comptroller, or their deputies; who, after examining their books, will grant warrant, which must be given to the surveyor, searcher, or land-waiter, for them to certify the quantity of goods; after which the certificate must be brought back to the collector and comptroller, or their deputies, and oath made that the said goods are really shipped, and not landed again in any part of Great Britain.

ENVELOPE, in fortification, a work of earth, sometimes in form of a simple parapet, and at others like a small rampart with a parapet: it is raised sometimes on the ditch, and sometimes beyond it.

ENVIRONNE', in heraldry, signifies surrounded with other things: thus, they say, a lion environné with so many bezants. See Bezant.

ENUMERATION, an account of several things, in which mention is made of every particular article.

ENUMERATION, in rhetoric, a part of peroration; in which the orator, collecting the scattered heads of what has been delivered throughout the whole, makes a brief and artful relation or recapitulation thereof.

ENVOY, a person deputed to negociate some affair with any foreign prince or state: Thofe sent from the courts of Britain, France, Spain, &c. to any petty prince or state, such as the princes of Germany, the republic
Upon this mutual respect between several nations, and enjoyment of the privileges of ambassadors, the ceremonies are not performed to them.

ENY, in ethics; pain felt, and malignity conceived, at the sight of excellence and happiness in another. See EMULATION.

EON, or EON. See EON.

EONIANS, in church history, the followers of Eon, a wild fanatic of the province of Bretagne, in the 12th century, whose brain was disordered. He concluded from the resemblance between sum, in the form for exercising malignant spirits, viz. Per eum, qui venturus est judicare vivos & mortuos, and his own name Eon, that he was the son of God, and ordained to judge the quick and dead. Eon, however, was solemnly condemned by the council at Rheims in 1148, at which Pope Eugenius III. presided, and ended his days in a miserable prison. He left behind him a number of followers and adherents, whom persecution and death to weakly and cruelly employed, could not persuade to abandon his cause, or to renounce an absurdity which; says Molheim, one would think could never have gained credit but in such a place as Bedlam.

EORIA, in mythology, a feast celebrated by the Athenians in honour of Erigonus, who, by way of punishment, for their not avenging the death of his father Icarus, engaged the gods to inflict the curse on their daughters, that they should love men who never returned their passion. The feast was instituted by the order of Apollo.

EOSTRE, in mythology, a Saxon goddess to whom they sacrificed in the month of April, called the month of Eoster; and hence the name Easter, which the Saxons retained after their conversion to Christianity, applying it to the festival celebrated in commemoration of our Saviour's resurrection.

EPACRIS, in botany: A genus of the monogynia order, belonging to the pentandria clas of plants. The calyx is a five-parted perianthium; the corolla monopetalous and tubular; the flamina five; very short filaments; the pericarpium a roundish, deprepeted, quinquelocular, quinquevalcular, gaping capsule; the seeds are numerous and very small.

EPACTS, in chronology, the excess of the solar month above the lunar synodal month, and of the solar year above the lunar year of twelve synodal months; or of several solar months above as many synodal months, and several solar years above as many dozen of synodal months.

The epacts, then, are either annual or mensural.

Mensural epacts are the excess of the civil or kalendar month above the solar month. Suppose, e. g., it were new-moon on the first day of January; since the lunar month is 29 days 12h. 44' 30"; and the month of January contains 31 days, the mensural epact is 1 day 11h. 15' 57'.'

Annual epacts are the excess of the solar year above the lunar. Hence, as the Julian solar year is 365 days 6h. and the Julian lunar year 354 days 8h.

The annual epact will be 10 days 21h. 22' 48"; that is, nearly 11 days. Consequently the epact of 2 years is 22 days; of 3 years, 33 days; or rather 3, since 30 days make an embolismic or intercalary month.

Thus the epact of four years is 14 days, and so of the rest; and thus, every 19th year, the epact becomes 30 or 0; consequently the 20th year the epact is 11 again; and the cycle of epacts expires with the golden number, or lunar cycle of 19 years, and begins with the same, as in the following table:

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Again, as the new moons are the same, that is, as they fall on the same day every 19 years, so the difference between the lunar and solar years is the same every 19 years. And because the said difference is always to be added to the lunar year, in order to adjust or make it equal to the solar year; hence the said difference respectively belonging to each year of the moon's cycle is called the epact of the said year, that is, the number to be added to the said year, to make it equal to the solar year; the word being formed from the Greek _emp_ _apact__s_.

Upon this mutual respect between the cycle of the moon and the cycle of the epacts, is founded this rule for finding the Julian epact, belonging to any year of the moon's cycle. Multiply the year given of the moon's cycle into 11; and if the product be less than 30, it is the epact sought; if the product be greater than 30, divide it by 30, and the remainder of the dividend is the epact. For instance, I would know the epact for the year 1714, which is the third year of the moon's cycle. Wherefore 3 is the epact for 1712; for 1143=s33, and 33 being divided by 30, there is left 3 of the dividend for the epact. But the difference of the Julian and Gregorian years being equal to the excess of the solar above the lunar year, or 11 days, it happens that the Gregorian epact for one year is the same with the Julian epact for the preceding year.

EPAMINONDAS, a celebrated Theban, the son of Polymnas; and one of the greatest captains of antiquity. He learned philosophy and music under Lybok, a Pythagorean philosopher; and was from his infancy instructed in all the exercises of body and mind. He was learned, generous, well-skilled in war, brave, modest, and prudent; and had such a regard for truth, that he would not tell a falsehood even in jest. He served first under the Lacedemonians; saved the life of Pelopidas their chief, who received in a battle seven or eight wounds; and contrasted a strict friendship with that general, which lasted till his death. At his perjuries, Pelopidas delivered the city of Thebes from the yoke of the Spartans, who had rendered themselves masters of Cadmea, which occasioned a bloody war between the two nations. Epaminondas was made general of the Thebans; on which he gained the celebrated battle of Leuctra, in which Cleombrotus, the valiant...
Ephemera
from ερημις, "a day;" a diary fever, or a fever of one day’s continuance only. In this case, such a heat as attends an excess of wine, a pulse somewhat full and quick, but soft and regular, a slight headache, a naufa, and refleffins, are all the symptoms, and which terminate without any sensible evacuation. If it continue unto the third day, it is not a diary fever; and if the constitution is very dry, an hectic is to be dreaded.

The Ephemeræ, the Day-fly, in zoology, a genus belonging to the order of Neuroptera. It has no teeth or palpi; there are two large protuberances above the eyes; the wings are creéd, the two hind ones being largest; and the tail is bristle. These flies, which take their names from the shortness of their life, are distinguished into several species. Some live several days, others do not take flight till the setting of the sun, and live not to see the rising of that luminary. Some exist but one hour, others but half that time; in which short period they comply with the call of nature. With respect to those who live several days, there is a peculiar observance, incident to themselves alone. They have to call off one f lavor more, or an operation which sometimes takes 24 hours to complete. To bring this about they cling fast to a tree. The ephemera, before they flutter in air, have in some manner been flies. They remain in the states of larva and chrysalis for one, two, or three years. The chrysalis only differs from the larva by their being observable on its back cafes for wings. Both have on their sides a series of small fringes of hair, which, when put into motion, serve them as fins. Nothing can be more curious than the plying of those little oars in the water. Their abdomen is terminated, as well as in their state of flies, by three threads. These larvae scoop themselves out dwellings in the banks of rivers; and they are small tubes made like siphons, the one serving for an entrance, the other affording them an outlet. The banks of some rivers are often perforated with them. When the waters decrease, they dig deep holes lower down, in order to enjoy their element the water. The season and hour when the chrysalids of the different species of the ephemera turn into flies, maintain a kind of regularity. The heat, the rife or fall of the waters, accelerate, however, or postpone their final display. The ephemerae of the Rhine appear in the air two hours before sunset. These flies are hatched almost all at the same instant in such numbers as to darken the air. The most early of those on the Marne and Seine in France do not begin to fly till two hours after
ENTOMOLOGY.

Plate CLXXXII.

Brazilian B.

Emberiza or Fanting.

Black-throated B.

Empus.

Ephemera.

Entecheus.
after the setting of the sun, towards the middle of August. They are seen fluttering and sporting on the brink of their tomb. The glare of light attracts them, round which they perform a thousand circles with amazing regularity. Their coming together for the purpose of generation can only be surmised, the shortsness of their life requiring that all its functions should be proportionable to their duration. Some naturalists have been of opinion, that the males imprisoned the eggs after the manner of flies. The females, by the help of the threads of their tail and the flapping of their wings, support themselves on the surface of the water, and in that almost upright situation drop their eggs in clutters. One single female will lay 700 or 800 eggs, which sink to the bottom. The larvae that escape from the voraciousness of the flies, set about the construction of habitations to shelter them from every kind of danger. When the flies have propagated, they are seen to die and fall by heaps. The land and water are strewed with them to a considerable thickness. The fishermen consider these multitudes of destroyed insects as manna for the flies.

EPHEMERIDES, in astronomy, tables calculated by astronomers, showing the present state of the heavens, for every day at noon; that is, the places where all the planets are found at that time. It is from these tables that the eclipses, conjunctions, and aspects of the planets, are determined; horoscopes or celestial schemes constructed, &c. We have ephemerides of Origam, Kepler, Argoli, Hecleterus, Mezzaracchis, Wing, De la Hire, Parker, &c. S. Cafini has calculated ephemerides of the sidera medicae or satellites of Jupiter, which are of good use in determining the longitude.

In England, the Nautical Almanac, or Astronomical Ephemerides, published annually by anticipation, under the direction of the commissioners of longitude, is the most considerable. In France, celestial ephemerides have been published by M. Desplaces every ten years, from 1715 to 1745: they were afterwards continued by the abbe Caille, with many additions; of which an account may be seen in the History of the Academy of Sciences for 1743. The Academy of Sciences have likewise published annually, from the beginning of the present century, a kind of ephemerides under the title of Connaissance des Temps.

EPHEBUS, a city of antiquity, much celebrated on account of its temple of Diana, and for being the most famous mart or staple town of Hither Asia. Ephesus was in ancient times the metropolis of all Asia. Stepheus gives it the title of Epiphanes, or most illustrious; and Pliny fills it the ornament of Asia. The ancient city stood about 50 miles south of Smyrna, near the mouth of the river Cayther, and the shore of the aesarian sea, which is a bay of the Egean; but as it has been so often destroyed and rebuilt, it is no easy matter to determine the precise place. Most of our modern travellers are of opinion, that the ancient city stood more to the north than the present; which they argue from the ruins that still remain. Ephesus was, in ancient times, known by the names of Alyspus, Ortygia, Meces, Smyrna, Trachea, Samianum, and Prisca. It was called Ephesus, according to Heracleides, from the Greek word ephesu, signifying permission; because Hercules (says he) permitted the Amazons to live and build a city in that place. Others tell us, that Ephesus was the name of the Amazon that founded the city; for Pliny, Justin, and Orosius, unanimously affirm that it was built by an Amazon, while others believe the honour upon Androclus, the son of Cordus, king of Athens, who was the chief of the Ionians that settled in Asia. But in matters of so early a date, it is impossible to come at the truth, and therefore not worth our while to dwell on such fruitless inquiries. What we know for certain is, that the city, which in the Roman times was the metropolis of all Asia, acknowledged Lyimachus for its founder; for that prince, having caused the ancient city to be entirely demolished, rebuilt, at a vast expense, a new one, in a place more convenient, and nearer the temple. Strabo tells us, that, as the inhabitants showed a great reluctance to quit their ancient habitations, Lyimachus caused all the drains that conveyed the water into the neighbouring fens and the Cayster to be privately stopped up; whereby the city being on the first violent rains in great part laid under water, and many of the inhabitants drowned, they were glad to abandon the ancient and retire to the new city. This new Ephesus was greatly damaged by an earthquake in the reign of Tibellus, but by that emperor repaired and adorned with several stately buildings, of which there are now but few ruins to be seen, and scarce any thing worthy of ancient Ephesus. The aqueduct, part of which is still standing, is generally believed to have been the work of the Greek emperors: the pillars which support the arches are of fine marble, and higher or lower as the level of the water required. This aqueduct served to convey water into the city from the spring of Halitee, mentioned by Pausanias. The gate now called by the inhabitants, for what reason we know not, the gate of Persephone, is remarkable for three bas-reliefs on the mould of an exquisite taste. The port, of which so many medals have been struck, is at present but an open road, and not much frequented. The Cayster was formerly navigable, and afforded a safe place for ships to ride in, but is now almost shoaled up with sand.

But the chief ornament of Ephesus was the temple of Diana, built at the common charge of all the states in Asia, and for its structure, size, and furniture, accounted among the wonders of the world. This great edifice was situated at the foot of a mountain, and at the head of a marsh; which place they chose, if we believe Pliny, as the least subject to earthquakes. This site doubled the charges; for they were obliged to be at a vast expense in making drains to convey the water that came down the hill into the marshes and the Cayster. Philo Byzantius tells us, that in this work they used such a quantity of stone, as almost exhausted all the quarries in the country; and these drains or vaults are what the present inhabitants take for a great. To secure the foundations of the conduits or fewer, which were to bear a building of such a prodigious weight, they laid beds of charcoal, says Pliny, well rammed, and upon them others of wool. Two hundred and twenty years, Pliny says 400, were spent in building this wonderful temple by all Asia. It was 445 feet in length, and 200 in breadth, supported by 127 marble pillars, 70 feet high, of which 27 were most curiously carved, and the rest polished. These pillars were the works of 60 many kings, and the bas-reliefs
Ephesus. — reliefs of one were done by Scopas, the most famous sculptor of antiquity; the altar was almost wholly the work of Praxiteles. Cheirophorae, who built the city of Alexandria, and offered to form Mount Athos into a statue of Alexander, was the architect employed on this occasion. The temple enjoyed the privilege of an asylum, which at first extended to a furlong, was afterwards enlarged by Mithridates to a bow-shot, and doubled by Marc Antony, so that it took in part of the city: but Tiberius, to put a stop to the many abuses and disorders that attend privileges of this kind, revoked them all, and declared that no man guilty of any wicked or dishonest action should escape justice, though he fled to the altar itself.

The priests who officiated in this temple were held in great esteem, and trusted with the care of sacred virgins, or priestesses, but not till they were made eunuchs. They were called Epheustes and Epheusa, had a particular diet, and were not allowed by their constitutions to go into any private house. They were maintained with the profits accruing from the lake Scinarius, and another that fell into it, which must have been very considerable, since they erected a golden statue to one Artemidorus, who being sent to Rome, recovered them after they had been seized by the farmers of the public revenues. All the Ionians reported yearly to Ephesus, with their wives and children, where they solemnized the festival of Diana with great pomp and magnificence, making on that occasion rich offerings to the goddess, and valuable presents to her priests. The affararchai, mentioned by St Luke, were, according to Beza, those priests whose peculiar province it was to regulate the public sports that were annually performed at Ephesus in honour of Diana: they were maintained with the collections made during the sports; for all Asia flocked to see them. The great Diana of the Ephesians, as she was styled by her blind adorers, was, according to Pliny, a small statue of ebony, made by one Canitia, though commonly believed to have been sent down from heaven by Jupiter. This statue was first placed in a niche, which, as we are told, the Amazons caused to be made in the trunk of an elm. Such was the first rise of the veneration that was paid to Diana in this place. In process of time the veneration for the goddess daily increasing among the inhabitants of Asia, a most stately and magnificent temple was built near the place where the elm stood, and the statue of the goddess placed in it. This was the first temple, but not quite so sumptuous as that which we have described, though reckoned, as well as the second, among the wonders of the world. The second, being that above described, was remaining in Pliny's time, and in Strabo's; and is supposed to have been destroyed in the reign of Constantine, purpurist to the edict by which that emperor commanded all the temples of the heathens to be thrown down and demolished: the former was burnt the same day that Alexander was born, by one Erotratus, who owned on the rock, that the only thing which had prompted him to destroy so excellent a work, was the desire of transmitting his name to future ages. Whereupon the common council of Asia made a decree, forbidding any one to name him; but this prohibition served only to make his name more memorable, such a remarkable extravagance, or rather madness, being taken notice of by all the historians who have written of those times. Alexander offered to rebuild the temple at his own expense, provided the Ephesians would agree to put his name on the front; but they rejected his offer in such a manner as prevented the relinquishment of that vain prince, telling him, that "it was not fit one god should build a temple to another." The pillars, and other materials that had been fayed out of the flames, were sold, and also the jewels of the Ephesian women, who on that occasion willingly parted with them; and the sum raised from thence served for the carrying on of the work till other contributions came in, which, in a short time, amounted to an immense treasure. This is the temple which Strabo, Pliny, and other Roman writers speak of. It stood between the city and the port, and was built, or rather finished, as Livy tells us, in the reign of King Servius. Of this wonderful edifice there is nothing at present remaining but some ruins, and a few broken pillars.

The Ionians first settled at Ephesus under the conduct of Androclus, who drove out the Carians and Leleges, by whom those places were possessed at his arrival. The city, whither built by him, as Strabo afirms, or by one Creesus or Ephesus, long before the Ionic migration, as others maintain, became the metropolis of Ionia. It was at first governed by Androclus, and his descendants, who allowed the royal title, and exercised the regal authority over the new colony: whence, even in Strabo's time, the potestas of Androclus were styled kings, and allowed to wear a scarlet robe, with a sceptre, and all the ensigns of the royal dignity. In process of time, a new form of government was introduced, and a senate established; but when, on what occasion, this change happened, we know not. This kind of government continued till the time of Pythagoras, who lived before Cyrus the Great, and was one of the most cruel and inhuman tyrants we read of in history; for, having driven out the senate, and taken all the power into his own hands, he filled the city with blood and rapine, not sparing even those who fled to the temple of Diana, for shelter. Pythagoras was succeeded by Pindarus, who bore the same sway in the city; but treated the citizens with more humanity. In his time Ephesus being besieged by Croesus king of Lydia, he advised the inhabitants to devote their city to Diana, and sullen the wall, by a rope, to the pillars of her temple. They followed his advice, and were, from reverence to the goddess, not only treated with great kindness by Croesus, but restored to their former liberty. Pindarus being obliged to resign his power, retired to Pelo-pernecus. He was, according to Elian, grandson to Alyattes king of Lydia, and Croesus's nephew. The other tyrants of Ephesus mentioned in history are, Athenagoras, Comias, Aristarchus, and Hegefas; of whom the last was expelled by Alexander, who, coming to Ephesus, after having defeated the Persians on the banks of the Granicus, bestowed upon Diana all the tributes which the Ephesians had paid to the Persians, and established a democracy in the city. In the war between Mithridates and the Romans, they sided with the former, and, by his direction, massacred all the Romans that refused in their city; for
which barbarity they were severely fined, and reduced almost to beggary by Sylla, but afterwards treated kindly, and suffered to live according to their own laws, as is plain from several ancient inscriptions and medals. The Ephesians were much addicted to superstition, forcery, and curious arts, as the scripture styles them; whence came the proverb "Ephesian letters," signifying all sorts of spells or charms.

In the time of the apostle Paul, Ephesus retained a great deal of its ancient grandeur. But it was a ruinous place, when the emperor Justinian filled Constantiopolis with its statues, and raised his church of St Sophia upon its columns. Since then it has been almost quite exhausted. Towards the end of the 11th century, a Turkish pirate, named Taurusperus, settled there. But the Greek admiral, John Ducas, defeated him in a bloody battle, and pursu'd the flying Turks up the Maeander. In 1308, it was among the places which suffered from the exactions of the grand-duke Roger; and two years after, it surrendered to Sultan Sylian, who, to prevent future insurrections, removed most of the inhabitants to Tyriuzum, where they were massacred. Ephesus appears to have subsisted as an inconsiderable place for some time. But now, the Ephesians are only a few Greek peasants, living in extreme wretchedness, dependence, and insensibility; the representatives of an illustrious people, and inhabiting the wreck of their greatness; some, the subdivisions of the former edifices which they raised; some, beneath the vaults of the Stadium, once the crowded scene of their diversions; and some, by the abrupt precipice, in the sepulchres which received their ashes.

EPHESE (from Φεσθε, "I fend forth"), in antiquity, a port of magistrates among the Athenians, instituted by king Demophon, to take cognizance of murder, manslaughter, and chancery-medley.

Their number was 100, whereof 50 were Athenians, and 50 Argians: they were not admitted to the post till upwards of 50 years of age. Draco new modelled it, excluded the Argians out of it, and made it to consist of 51 Athenians, each above 50 years of age: Ubbio Emmanes de Rep. Athen. says, he transferred to them part of the jurisdiction of the Areopagites. See AREOPAGUS.

EPHES, in Jewish antiquity, one part of the priestly habit; being a kind of girdle, which, brought from behind the neck over the two shoulders, and hanging down before was put across the stomach, then carried round the waist, and made use of as a girdle to the tunic. There were two sorts of ephes, one of plain linen for the priests, and the other embroidered for the high priest.

EPHORI, in Grecian antiquity, magistrates established in ancient Sparta to balance the regal power. The authority of the ephori was very great. They sometimes expelled and even put to death the kings, and abolished or suspended the power of the other magistrates, calling them to account at pleasure. There were five of them, others say nine. They presided in the public shows and festivals. They were entrusted with the public treasuries; made war and peace; and were to absolute, that Aristotle makes their government equal to the prerogative of a monarchy. They were established by Lycurgus, according to the generality of authors: though this is denied by others, who date their origin 150 years after the time of that legislator. Thus Plutarch, in his life of Cleomenes, afcribes their institution to Theopompos king of Sparta; which is also confirmed by the authority of Aristotle.

EPHRUS, an orator and historian of Cumae in Italy, about 352 years before Christ. He was disciple to Iocrates, by whose advice he wrote an history which gave an account of all the actions and battles that had happened between the Greeks and Barbarians for 750 years. It was greatly esteemed by the ancients; but is now lost.

EPHRAIM (anc. geog.), one of the divisions of Palestinian tribes; Ephraim and the half tribe of Manasseh are blended together by the sacred writer; and it only appears that Ephraim occupied the more southern, and the half tribe of Manasseh the more northern part, but both seem to have extended from the Jordan to the sea. Ephraim also denotes a kingdom, on the separation of the two tribes from the house of David, called also the kingdom of Israel and of Samaria.

EPHRATA, a small town of Pennsylvania in America, and the principal settlement of the religious sect called Dunkards or Tunkers. See TUNKERS.

EPHIlem (Syrus), an ancient Christian writer, in the fourth century, deacon of Eclis, was born at Nisibis, in Syria. He was greatly esteemed by St. John, St. Gregory, Nyffen, and other great men. He wrote against the opinions of Sabellius, Arius, Apollinaris, the Manichees, &c. and acquired such a reputation by his virtue and his works, that he was called the doctor and the prophet of the Syrians. He died in 378. The best editions of his works are, that of Oxford, in 1705, in folio, and that of Rome, from 1732 to 1736, in Syriac, Greek, and Latin, 6 vols folio.

EPHYDORO, in antiquity, an officer in the Athenian courts of justice, who was to provide the plaintiff and defendant with equal water hour-glases. When the glafs was run out they were not permitted to speak any farther; and, therefore, we find them very careful not to lose or misplace one drop of their water. Whilst the laws quoted by them were reciting, or if any other business happened to intervene, they gave orders that the glafs should be stopped.

EPIBATAM, among the Greeks, marines or soldiers who served on board the ships of war. They were armed in the same manner as the land forces, only that more of them wore full or heavy armour.

EPIBATERIUM, a poetical composition, in use among the ancient Greeks. When any person of condition and quality returned home after a long abencesjourney into another country, he called together his friends and fellow-citizens, and made them a speech, or rehearsed them a copy of verses, wherein he returned solemn thanks to the immorial gods for his happy return; and ended with an address by way of compliment to his fellow citizens.—These verses made what the Greeks call epibaterion epibaterion, of epibat, "I go abroad." At going away they had another, called apobaterion.

EPIBATERIUM, in botany: A genus of the lycosia order, belonging to the monoea class of plants. In the male flowers the calyx is a double...
Epic perianthium, the outward one with six leaves, very small; the inner one three-leaved, and three times larger than the former, with egg-shaped leaves. The corolla has six petals smaller than the inner calyx and roundish. The lamina are six capillary filaments, crooked, and as long as the petals; the anthers are roundish. The female flowers are on the same plant. The calyx and corolla are as in the male. The pericarpium is extremely small; the inner one three-leaved, and three times roundish. The lamina are.

EPI, or Epic, Poem, a poem expressed in narration, formed upon a story partly real and partly feigned; representing in a sublime style, some signal and fortunate action, distinguished by a variety of great events, to form the morals, and affect the mind with the love of heroic virtue.

We may distinguish three parts of the definition, namely, the matter, the form, and the end. The matter includes a portion of the fable, under which are ranged the incidents, episodes, characters, morals, and machinery. The form comprehends the way or manner of the narration, whether by the poet himself, or by any person introduced, whose discourse is related; to this branch likewise belong the moving of the passions, the description of scenes, sentences, sentiments, thoughts, style, and verification; and besides these the similes, tropes, figures, and, in short, all the ornaments and decorations of the poem. The end is to improve our morals and increase our virtue. See Poetry.

EPIC Addor (formed of on us, and usus funeral), in the Greek and Latin poetry, a poem, or poetical composition, on the death of a person. At the obsequies of any man of figure, there were three kinds of discourses usually made; that rehearsed at his bursam or funeral pile, was called usus; that engraven on his tomb, epitaph; and that spoken in the ceremony of his funeral epideinion. We have two beautiful epicodies in Virgil, that of Euryalus and that of Pallas.

EPICEMIUM, in ancient poetry, a poem rehearsed during the funeral solemnity of persons of distinction.

EPICHARMAS, an ancient poet and philosopher, born in Sicily, was a scholar of Pythagoras. He is said to have introduced comedy at Syracuse in the reign of Hiero. Horace commends Plato to imitating him, in following the chace of the intrigue so closely as not to give the reader or spectator time to trouble themselves with doubts concerning the discovery. He wrote likewise treatises concerning philosophy and medicine; but none of his works have been preserved. He died aged 90, according to Laertius, who has preserved four verses inferred on his name.

EPICHIROTONIA, among the Athenians. It was ordained by Solon, that once every year the laws should be carefully revised and examined; and if any of them were found unsuitable to the present state of affairs, they should be repeated. This was called apaxitron, from the manner of giving their suffrages by holding up their hands. See a farther account of this custom in Pott. Archaeol. Graec. lib. r. cap. 25. tom. i. p. 142.

EPICISINE, in grammar, a term applied to nouns, which, under the same gender and termination, mark indifferently the male and female species. Such in Latin is aquila, vespertilio, &c. which signify equally a male or female eagle or bat.

Grammarians distinguish between epicene and common. A noun is said to be common of two kinds, when it may be joined either with a masculine or feminine article; and epicene, when it is always joined to some of the two articles, and yet signifies both genders.

EPICETUS, a celebrated Stoic philosopher, born at Hierapolis in Phrygia, in the first century, was the slave of Epaphroditus, a freedman and one of Nero's guard. Domitian banishing all philosophers from Rome, about the year 94, Epicetus retired to Nicopolis in Epirus, where he died in a very advanced age; and after his death, the earthen lamp he made used of held for 3000 drachmas. He was a man of great modesty; which was eminent in his own practice, as well as in his recommendation to others: hence he used to say, 'That there is no need of adorning a man's house with rich hangings or paintings, since the most graceful furniture is temperance and modesty, which are lasting ornaments, and will never be the worse for wearing.' Of all the ancient philosophers, he seems to have made the nearest approaches to the Christian morality, and to have had the most just ideas of God and providence. He always possessed a cool and serene mind, unruffled by passion; and was used to say, that the whole of moral philosophy was included in these words, support and abstain. One day his master Epaphroditus strove in a frolic to wrench his leg; when Epicetus said, with a smile, and free from any emotion, 'If you go on, you will certainly break my leg,' but the former, redoubling his effort, and striking it with all his strength, heartily broke the bone; when all the return Epicetus made was, 'Did not I tell you, Sir, that you would break my leg?' No man was more expert at reducing the rigour of the maxims of the Stoics into practice. He conformed himself strictly, both in his discourse and behaviour, to the manners of Socrates and Zeno. He waged continual war with fancy and fortune; and it is an excellence peculiar to himself, that he admitted all the severity of the Stoics without their frountes, and reformed Stoicism, as well as professed it; and besides his vindicating the immortality of the soul as fireously as Socrates or any Stoic of them all, he declared openly against self-murder, the unlawfulness of which was maintained by the rest of the sect. Arian, his disciple, wrote a large account of his life and death, which is lost; and preserved four books of his discourses and his Euchiridion, of which there have been several editions in Greek and Latin; and, in 1758, a translation of them into English was published by the learned and ingenious Mis Carter.

EPICURIAN PHILosophy, the doctrine or system of philosophy maintained by Epicurus and his followers.

His philosophy consisted of three parts; canonical, physical, and ethereal. The first was about the canons or rules of judging. The cenure which Tully palis upon him for his despising logic, will hold true only with regard to the logic of the Stoics, which he could not approve of, as being too full of nicety and quirk, Epicurus was not acquainted with the analytical method of division and argumentation, nor was he so curious in modes and formation as the Stoics. Soundness and
EPI [ 685 ]

Epicurean simplicity of fene, affixed with some natural reflec-
tions, was all his art. His search after truth proceed-
ed only by the senses; to the evidence of which he gave
to great a certainty, that he considered them as an in-
fallable rule of truth, and termed them the first natural
light of mankind.

In the second part of this philosophy he laid down
atoms, space, and gravity, as the first principles of all
things: he did not deny the existence of God, but
thought it beneath his majesty to concern himself with
human affairs; he held him a blessed immortal Being,
having no affairs of his own to take care of, and above
meddling with those of others.

As to his ethics, he made the supreme good of man
to consist in pleasure, and consequently supreme evil in
pain. Nature itself, says he, teaches us this truth;
and prompts us from our birth to procure whatever gives
us pleasure, and avoid what gives us pain. To this end
he proposes a remedy against the sharpness of pain:
this was to divert the mind from it, by turning our
whole attention upon the pleasures we have formerly
enjoyed. He held that the wife man must be happy, as
long as he is wife: the pain, not depriving him of his
wifdom, cannot deprive him of his happiness.

There is nothing that has a clearer show of honesty
than the moral doctrine of Epicurus. Gaffendas pre-
tends, that the pleasure in which this philosopher has
fixed the sovereign good, was nothing else but the high-
est tranquility of mind, in conjunction with the most
perfect health of body; but Tully, Horace, and Plu-
tarch, as well as almost all the fathers of the church,
give us a very different representation: indeed the na-
ture of this pleasure, in which the chief happiness is
supposed to be found, is a grand problem in the mo-
als of Epicurus. Hence there were two kinds of E-
picureans, the rigid and the remiss: the first were those
who underfood Epicurus's notion of pleasure in the
best sense, and placed all their happiness in the pure
pleasures of the mind, reflecting from the practice of
virtue: the loose or remiss Epicureans, taking the words
of that philosopher in a gross sense, placed all their
happiness in bodily pleasures or debauchery.

Epicurus, the greatest philosopher of his age, was
born at Gargaretum in Arcadia, about 340 B.C. in the
10th Olympiad. He settled at Athens in a fine garden
he had bought; where he lived with his friends in great
tranquility, and educated a great number of disciples.
They lived all in common with their master. The re-
spect which his followers paid to his memory is admi-
rable: his school was never divided, but his doctrine
was followed as an oracle. His birth-day was still
kept in Pliny's time; the mouth he was born in was
observed as a continual festival; and they placed his
picture everywhere. He wrote a great many books,
and valued himself upon making no quotations. He
raised the atomical system to a great reputation,
though he was not the inventor of it, but had only
made some change in that of Democritus. As to his
doctrine concerning the supreme good or happi-
ness, it was very liable to be misrepresented, and some
ill effects proceeded from thence, which discredited his
feet. He was charged with perverting the worship of
the gods, and inexciting men to debauchery; but he did
not forget himself on this occasion: he published his
opinions to the whole world: he wrote some books of
devotion; recommended the veneration of the gods, fo-
briety, and chastity; and it is certain that he lived in an
exemplary manner, and conformably to the rules of
philosophical wisdom and frugality. Timocrites, a de-
terior of his sect, spoke very scandalously of him. Ga-
fendas has given us all he could collect from the anc-
ients concerning the person and doctrine of this philos-
opher: who died of a suppuration of urine, aged 72.

EPICYCLE, in the ancient astronomy, a little
circle whose centre is in the circumference of a greater
circle; or it is a small orb or sphere, which being fixed
in the deferent of a planet, is carried along with it;
and yet, by his own peculiar motion, carries the plan-
et fastened to it round its proper center.

It was by means of epicycles that Ptolemy and his
followers solved the various phenomena of the planets,
but more especially their stations and retrogradations.

EPICYCLOID, in geometry, a curve generated
by the revolution of the periphery of a circle, along
the convex or concave side of the periphery of another
circle.

EPICYEMA, among physicians, denotes a super-
fetation; being a false conception or mole happening
after the birth of a regular fetus.

EPIDAURUM, EPIDAurus, or EPITaurum, (anc.
geo.), a town of Dalmatia, on the Adriatic, built the
same year, as it is said, with Dyrrachium, 430 years af-
fer the destruction of Troy: A considerable town for-
merly, but now reduced to a small village, called Ra-
qui Vecchius; distant six miles from the modern Ragufi.
E. Long. 19°. Lat. 42°, 20'.

EPIDAURUS (anc. geo.), a town of Argolis,
in Peloponnesus, on the Saronic bay, to the south of
the promontory Spireum, called sacred, because of the
religious veneration paid to Aeclalus, whose temple
stood at the distance of five miles from the town. The
Romans, during a pellicience, being advised to conveys
the god to Rome, sent a ship, with a solemn embassi
for his conveyance: while the Epicurians were in
fume to part with him, a huge serpent failed to the
ship; and, being taken for the god, was carried to Rome in great solemnity. Epicurus, after his
death, was exalted to the temple of the gods. What is the
place of his temple, in and the acropolis or citadel
was a remarkable feature of Minerva. The site is now
called Epistheoros. The traces are indistinct, and it
has probably been long deserted. The harbour of
Epicurus is long. Its periplus or circuit was 15
stadia or near two miles. The entrance is between
mountains, and on a small rocky peninsula on the left
hand are ruins of a modern fortres. This, it seems,
was the place on which a temple of Juno stood. It is
frequented by vesels for wood or corn. The grove of
Aeclalus was inclosed by mountains, within
which all the sacrifices as well of the Epicurians as
of strangers were confumned. One was called Titthion;
and on this the god when an infant was said to have been
exposed, and to have been suckled by a fte-goat.
He was a great physician, and his temple was always crowd-
ed with sick persons. Beyond it was the dormitory of
the suppliants; and near it, a circular edifice called the
Tholus, built by Polycrates, of white marble, worth
feeling. The grove, besides other temples, was adorn-
when those drearies, who could not be present every Epidemic where, were supposed to visit different places, in order to receive the vows of their adorers.

EPIDEMIC, among physicians, an epithet of diseases which at certain times are popular, attacking great numbers at or near the same time.

EPIDENDRUM, in botany: A genus of the diandria order, belonging to the gynandria class of plants; and in the natural method ranking under the seventh order, Orchides. The nectarium is subdivided, oblique, and reflexed. This is the plant which produces the fruit called vanilla, and which is used in the making of chocolate. It is a native of Mexico, and also of some parts of the East Indies. It is a parasitic plant; the leaves of which greatly resemble the vine, and are about 18 inches long and three inches broad. The flowers are of a white colour intermixed with stripes of red and yellow. When these fall off, they are quickly succeeded by the pods, which at first are green, but afterwards, as they ripen, become yellow, and are gathered for use. The pods of the beet vanilla are long, slender, and well filled with seeds. If opened when fresh, the cavity of the pod is found to contain a humid substance that is black, oily, and balsamic, of such a strong smell, that it frequently causes headaches, and even a sort of temporary intoxication. The season for gathering the pods begins about the latter end of September, and lasts till the end of December. They are dried in the shade; and when dry and fit for keeping, they are rubbed externally with a little oil of cocoa or calba, to render them supple, or preserve them the better, and to prevent them from becoming too dry or brittle. The use of this fruit is only for perfuming chocolate. In New Spain it is reckoned unwholesome; and therefore never used: but in England and other countries of Europe, it is a constant ingredient; and perhaps its noxious qualities may be corrected by the sea-air. In those countries where they grow, the plants are very easily propagated by cuttings. In Britain they require to be kept in a fove, and to be placed near some American rice, round which they may climb for their support.

EPIDERMIS, in anatomy, the cuticle or scurf-skin. See Anatomy, p. 74. The word is formed of the Greek epidermios, on or over; and epidermios, skin.

EPIDICASIA, among the Athenians. Daughters inheriting their parents estate, were obliged to marry their nearest relation; which gave occasion to perons of the same family to go to law with one another, each pretending to be more nearly allied to the heirifs than the rest. The suit was called epidicasia, and the virgin, about whom the relations contented, epidaxuan.

EPIDIDYMIS, in anatomy, a little round body, on the back of each testicle; called also parafierisa. See Anatomy, p. 738, col. 1.

EPIGLEAN, in botany: A genus of the monogynia order, belonging to the decandria class of plants, and in the natural method ranking under the 18th order, Biornes.

EPIDOTÆ, certain deities who presided over the growth of children. They were worshipped by the Laedemonians, and chiefly invoked by those who were persecuted by the ghosts of the dead, &c.
EPIGRAM, in poetry, a short poem in verse, treating only of one thing, and ending with some lively, instructive, and natural thought or point. The word is formed of "epi," signifying, or inscribed, and "gram," to write or write upon.

Epigrams then, originally, signify inscriptions, and they derive their origin from those inscriptions placed by the ancients on their tombs, statues, temples, triumphal arches, &c. These, at first, were only simple mottos; afterwards, increasing their length, they made them in verse, to be the more easily retained. The name of epigram remained to us several of them. Such little poems retained the name of epigrams, even after the design of their first institution was varied, and people began to use them for the relation of little facts and accidents, the characterizing of persons, &c. The point or turn is a quality much insisted on by the critics, who require the epigram constantly to close with something poignant and unexpected, to which all the rest of the composition is only preparatory; while others, on the contrary, exclude the point, and require the thought to be equally diversified throughout the poem without laying the whole fires of the close; the former is usually Martial's practice, and the latter that of Catullus.

The Greek epigrams have scarce any thing of the point or brilliancy of the Latin ones; those collected in the Anthology, have most of them a remarkable air of ease and simplicity, attended with something just and witty; such as we find in a sensible peasant, or a child Epigraph that has wit. They have nothing that bites, but something that tickles. Though they want the full of Martial, yet to a good taste they are not inlaid: except a few of them, which are quite flat and spiritless. However, the general quaintness and delicacy of the pleasantry in them has given them a place in the Greek epigram, or epigram à la Grece, to denote, among the French, an epigram void of salt or sharpness.

The epigram admits of great variety of subjects; some are made to praise and others to satirize; which last are much the easiest, ill-natured servile instead of point and wit. Boileau's epigram's are all satires on one or another; those of des Reaux are all made in honour of his friends; and those of Mad. Scudery are so many elegies. The epigram being only a single thought, it would be ridiculous to express it in a great number of verses.

EPIGRAPH, among antiquarians, denotes the inscription of a building pointing out the time when the persons by whom, the uses, and the like, for which it was erected.

EPILEPSY, in medicine, the same with what is otherwise called the falling-sicknes, from the patient's falling suddenly to the ground. See *Medicine-Index*.

EPILIBIUM, the willow-herb, in botany: A genus of the monogynia order, belonging to the aquaria class of plants, and in the natural mother a Greek epigram, or epigram à la Grece, to denote, among the French, an epigram void of salt or sharpness.
EPIMENIDES, an ancient poet and philosopher, was born at Gnossus in Crete. Contrary to the custom of his country, he always wore his hair long; which, according to some, was because he was ashamed of being thought a Cretan: and indeed he does not seem to have had a high opinion of his countrymen, if that were cited by St Paul be, as it is generally believed to be, his; “The Cretans are always liars, evil beasts, flow-bellies.” Many stories are related of him, too wonderful to merit attention: however, his reputation was so great over all Greece, that he was there beloved; his; his; his; to invitation, accompanied the son of Niceratus, with a favourite of the gods. The Athenians being afflicted with the plague, and commanded by the oracle to make a solemn libration of the city, sent Nicias, the son of Niceratus, with a ship to Crete, to desire Epimenides to come to them. He accepted their invitation, accompanied the messengers to Athens, performed the libration of the city, and the plague ceased. Here he contracted an acquaintance with Solon, whom he privately introduced in the proper methods for the regulation of the Athenian commonwealth. Having finished his business at Athens, the citizens offered him many valuable presents and high honours, and appointed a ship to carry him back to Crete: but he returned their presents, and would accept of nothing except a little branch of the sacred olive preferred in the citadel; and desired the Athenians to enter into an alliance with the Gnossians. Having obtained this, he returned to Crete, where he died soon after, aged 157 years; or as the Cretans, confidently with their character, pretended, 200. He was a great poet, and wrote 5000 verses on “the genealogy of the gods,” 6500 “on the building the ship Argos and Jason’s expedition to Colchis,” and 4000 “concerning Minos and Rhadamathus.” He wrote also in prose, “Concerning sacrifices and the commonwealth of Crete.” St Jerome likewise mentions his “book of oracles and responses.” The Lacedemonians procured his body, and preferred it among them by the advice of an oracle; and Plutarch tells us, that he was reckoned the seventh wife man by those who refused to admit Periander into the number.

EPIPHANEUS, a son of Japetus and Clymene, one of the Oceiades, who inconsiderably married Pandora, by whom he had Pyrrha, the wife of Dincul. He had the curiously to open the box which Pandora had brought with her, and from thence issued a train of evils, which from that moment have never ceased to afflict the human race. Hope was the only one which remained at the bottom of the box, not having a sufficient time to escape, and it is the alone which comforts men under misfortunes. Epiptheus was changed into a monkey by the gods, and sent into the island Phthica.

EPIPHANIUS (St), an ancient father of the church, born at Beaufort, a village in Palatine, about the year 322. He founded a monastery near the place of his birth, and presided over it. He was afterward elected bishop of Salamis; when he fled with Paulinus against Meletius, and ordained in Palestine, Panilian the brother of St Jerem; on which a contet rose between him and John bishop of Jerusalem. He afterwards called a council in the island of Cyprus, in which he procured a prohibition of the reading of Origen’s writings; and made use of all his endeavours to prevail on Theophilus bishop of Alexandria to engage St Chrysostom to declare in favour of that decree: but not meeting with success, he went himself to Constantinople, where he would not have any conversation with St Chrysostom; and formed the design of entering the church of the apostles, to publish his condemnation of Origen; but being informed of the danger to which he would be exposed, he resolved to return to Cyprus; but died at sea, in the year 401. His works were printed in Greek, at Basil, 1542, in folio; and were afterwards translated into Latin, in which language they have been often reprinted. Petavius revised and corrected the Greek text by two manuscripts, and published it together with a new translation at Paris in 1622. This edition was reprinted at Cologne in 1682.

EPIPHANY, a Christian festival, otherwise called the Manifestation of Christ to the Gentiles, observed on the sixth of January, in honour of the appearance of our Saviour to the three magi or wise men, who came to adore him and bring him presents. The feast of epiphany was not originally a distinct festival; but made a part of that of the nativity of Christ, which being celebrated 12 days, the first and last of which were high or chief days of solemnity, either of these might properly be called epiphany, as that word signifies the appearance of Christ in the world.

The word in the original Greek, epiphania signifies appearance or apposition; and was applied, as some critics will have it, to this feast, on account of the star which appeared to the magi—St Jerome and St Chrysostom take the epiphany for the day of our Saviour’s baptism, when he was declared to men by the voice, Epiphania, see Oratory, p. 96.

EPIPHORA, in medicine, a preternatural defluxion of the eyes, when they continually discharge a sharp serous humour, which excoriates the cheeks.


EPIPLECLE, in medicine, is a kind of hernia or rupture, in which the omentum tubides into the scrotum.
EPI [ 689 ]

EPILOOMPHALON, in medicine, an hernia umbilicalis, proceeding from the omentum falling into the region of the umbilicus or navel.

EPILOON. See OMENTUM.

EPIRUS, a district of ancient Greece, bounded on the east by Eetolia, on the west by the Adriatic, on the north by Thessaly and Macedonia, and on the south by the Ionian sea. This country was anciently governed by its own princes, in which state it made a very considerable figure. The country, according to Josephus, was first peopled by Dodanim the son of Javan and grandfather of Japhet. The people were very warlike; but they continued in their savage state long after their neighbours were civilized; whence the Ishmaelites used to threaten their neighbours with transportation to Epirus. Their horses were in great request among the ancients, as well as the dogs produced in one of the divisions called Molossi; and hence these dogs were called by the Romans Molossi.

The history of Epirus commences with the reign of Pyrrhus the son of Achilles by Deidamia the daughter of Lycomedes king of Scyros. He is said to have behaved with great bravery at the siege of Troy; but it would appear that he behaved with no less barbarity. After the city was taken, he is said to have killed old king Priam with his own hand; to have thrown Clytemnestra the son of Hector and Andromache headlong from an high tower; and sacrificed Polyxena the daughter of Priam on the tomb of his father. He carried Andromache with him into Epirus, where he seduced by the advice of the famous soothsayer Helenus, one of Priam’s sons, who had served during the Trojan war both under his father and himself. The only remarkable period of the history of Epirus is the reign of Pyrrhus II. who made war upon the Romans. He was invited into Italy by the Tarentines; and embarked about 280 B.C. After having escaped many dangers by sea, he landed in that country, and with great difficulty gained a victory over the Romans; but he was afterwards utterly defeated by them, and obliged to return into his own country. To retrieve his honour, he then undertook an expedition against Macedon; where he overthrew Antigonus, and at last himself master of the whole kingdom. He then formed a design of subduing all the other Grecian states; but met with such an obstinate resistance at Lacedemon, that he was obliged to drop the enterprise; and was soon after killed at the siege of Argo by a woman, who from the wall threw a tile upon his head. Deidamia, the grand-daughter of Pyrrhus, was the last that sat on the throne of Epirus. She is said to have been murdered after a short reign; upon which the Epirots formed themselves into a republic.

Under the new form of government Epirus never made any considerable figure, but feems rather to have been dependent on the kingdom of Macedon. The Romans having conquered Philip king of that country, restored the Epirots to their ancient liberty; but they, forgetful of this favour, soon after took up arms in favour of Perseus. As a punishment for this ingratitude, the Romans gave orders to Paulus Emilius, after the redaction of Macedon, to plunder the cities of Epirus, and level them with the ground. This was punctually executed throughout the whole country on the same day and at the same hour. The booty was sold; and each foot soldier had 200 drachmae, that is, six pounds Epirus, nine shillings and two-pence, and each of the horse Episcopacy the double of this sum.

The Romans having conquered Philip king of that country, and Macedon become a diocese, Epirus was made a province of itself, called the province of Old Epirus, to distinguish it from New Epirus, another province lying to the east of it. On the division of the empire, it fell to the emperors of the east, and continued under them till the taking of Constantinople by the Latins, when Michael Angelus, a prince nearly related to the Greek emperor, seized on Epirus and of, of which he declared himself de jure prince; and was succeeded by his brother Theodorus, who took several towns from the Latins, and so far enlarged his dominions, that, disdaining the title of de jure, he assumed that of emperor, and was crowned by Demetrius archbishop of Bulgaria. Charles, the last prince of this family, dying without lawful issue, bequeathed Epirus and Achaia to his natural sons, who were driven out by Amurath the second. Great part of Epirus was afterwards held by the noble family of the Caffriots; who, though they were masters of all Albania, yet styled themselves princes of Epirus. Upon the death of the famous George Caffriot, surnamed Sanderbeg, Epirus fell to the Venetians, who were soon dispossessed of it by the Turks; in whose hands it still continues, being now known by the name of Albania, which comprehends the Albania of the ancients, all Epirus, and that part of Dalmatia which is subject to the Turks.

EPISTOCAPY, that form of church government, in which diocesan bishops are established as distinguished from and superior to priests or presbyters. We have already observed, that it is a long time since the ministers of religion have been distinguished into different orders, and that it has been much controverted whether the distinction of divine or human right; whether it was attended with the apostolic age or afterwards. (See Bishop.) This controversy commenced soon after the Communion Reformation; and has been agitated with great warmth between the Episcopalians on the one side, and the Presbyterians and Independents on the other. Among the protestant churches abroad, those which were reformed by Luther and his associates are in general Episcopal, whilst such as follow the doctrines of Calvin have for the most part thrown off the order of bishops as one of the corruptions of popery. In England, however, the controversy has been considered as of greater importance than on the Continent; for it has there been strenuously maintained by one party, that the episcopal order is essential to the constitution of the church; and by others, that it is a pernicious encroachment on the rights of men, for which there is no authority in scripture. Though the question has for some time lain almost dormant, and though we have no desire to revive it; yet as a work of this kind might perhaps be deemed
...the rule was hed of some apostles, and of some fiered pel; and it is certain, that the inde­piicacyed allIdl con:rovcr{y linked together Chri~iarn one e God. "mguom
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Of the society thus constituted, it was not, as of a philosophical tetch, left to every man's choice whether or not he would become a member. All who embrace the faith of the Redeemer of the world are required to be baptized, under the pain of forfeiting the benefits of redemption: but one great purpose for which baptism was instituted, is to be the rite of initiation into the church of Christ; "for by one spirit are we all bap­tized into one body, whether we be Jews or Gentiles whether we be bond or free," (1. cor xii. 13.) Of baptism, whatever be the importance, it is evident, that to receive it, is not, like the practice of justice, or theDoc214056

At that period, we are assured that the number of his followers was not less than five hundred; yet we find that to the eleven disciples only did "he come and speak­ ing. All power is given unto me in heaven and earth; go ye, therefore, and teach all nations, baptiz­ing them in the name of the Father, and of the Son, and of the Holy Ghoit." Of the 500 disciples there is surely no reason to be­lieve that there were not many well qualified to instruct either a few or a Gentile in the doctrines of the gos­pel; and it is certain, that any one of them could have washed his convert with water in the name of the Holy Trinity as well as St Peter or St John: but an unauthorized washing would not have been Christian baptism, nor of equal validity with it, any more than the opinion of a lawyer at the bar is the judgment of a court of justice, or equal obligation. It is the com­mission

Episcopacy ed defective, did it contain no account whatever of a controversy which has employed some of the ablest writers of the past and present centuries, we shall give a fair though short view of the chief arguments, by which the advocates of each contending party have endeavoured to support their own cause, leaving our re­aders to judge for themselves where the truth lies. See INDEPENDENTS and PRIESTLYANS.

The Independent maintains, that under the gospel dispensation there is nothing which bears the smallest resemblance to an exclusive priesthood; that Christ and his apostles constituted no permanent order of ministers in the church; but that any man who has a firm be­lief in revelation, a principle of sincere and unaffected piety, a capacity for leading devotion and communicating instruction, and a serious inclination to engage in the important employment of promoting the everlasting salvation of mankind; is to all intents and purposes a regular minister of the New Testament, especially if he have an invitation to the pastoral office from some particular society of Christians.

Against this scheme, which supposes the rights of Christians all equal and common, and acknowledges no authority in the church except what may be derived from the election of her members, the Protestant Epis­copalian reasons in the following manner. He admits, as an undisputed truth, that our blessed Lord gave to none of his immediate followers authority or jurisdiction of such a nature, as could interfere with the rights of the civil magistrates, for all such power was disclaim­ed by himself; "My kingdom (said he to Pilate) is not of this world!" and to a certain perfon who asked him to decide a question of property between him and his brother, he replied, "Man, who made me a judge or a divider over you?" But when it is considered, that Christ came into this world to turn men from darkness to light, and from the power of Satan to the living God; that he gave himself for us, that he might redeem us from all iniquity, and purify to himself a peculiar people zealous of good works; that of these works many are such as regenerate nature has no incli­nation to perform, and that the doctrines which he revealed are such as human reason could never have discov­ered; the advocate for episcopacy thinks it was ex­tremely expedient, if not absolutely necessary, that, when he ascended into heaven, he should establish upon earth some authority to illustrate the revelation which he had given, and to enforce obedience to the laws which he had enacted. There is nothing, continues he, more strictly required of Christians, than that they live together in unity, professing the same faith, join­ing in the same worship, and practicing the same vir­tues. But as men have very different passions, preju­dices, and pursuits, such unity would be impossible, were they not linked together in one society under the government of persons authorized to watch over the purity of the faith, to prescribe the forms of public worship, and to explain the nature and inculcate the necessity of the several virtues. The society of Chi­Rians, in respect of its unity and organization, is com­pared to the human body: for "as we have many mem­bers in one body, and all members have not the same functions, so we being many are one body, and every one members one of another." (Rom. xii. 4, 5.) It is called the church, the kingdom of heaven, and the kingdom of God; and its affairs, like those of Episcopacy every other kingdom, are administered by proper officers in subordination to the one Lord, "when he ascended up on high, and led captivity captive, gave some apostles, and some prophets, and some pastors and teachers, for the perfecting of the saints, for the work of the ministry, for the edifying of the body of Christ." (Ephel. iv. 8--13.) That those various or­ders of ministers were vested with real authority in the church, might be inferred from principles of reason as well as from the dictates of revelation. A society without some sort of government, government without laws, or laws without an executive power, is a direct absurdity. Where there are laws, some one govern, and others obey; some must direct, and others submit to direction. This is the voice or nature; it is likewise the language of scripture. "Obey them (say the inspi­red author of the epistle to the Hebrews) who have the rule over you, and submit yourselves: for they watch for your souls as they that must give account." A text which shows that the authority of the ministers of religion was distinct from that of the civil magi­trate, whole duty is to watch not for the souls, but for the lives and properties, of his subj ects.

The church governed by proper officers.

All Christians re­quired to be mem­bers of the church.

4 Christians linked to­gether in one society called the church, the kingdom of heaven, and the kingdom of God.

5 The church governed by proper officers.

6 All Chr[i]ans re­quired to be mem­bers of the church.

7 All Chr[i]ans not authorized to admin­ister the fa­cramentals.
Episcopacy is the sovereign which gives force to the judgments of the court; it is the communion of Christ which gives validity to baptism. The same reasoning is applicable to the Lord's supper, which, if it be not administered by those who have authority for such administration, cannot be deemed a sacrament of Christ's institution.

These two rites are the external badges of our profession. By the one, we are incorporated into that society of which our Redeemer is the head and sovereign; in the celebration of the other, we have a right to join, whilft of that society we continue members. But if by an open and scandalous disregard of the precepts of the gospel, we should prove ourselves unworthy of its privileges, the same persons who were authorized to admit us into the church, are likewise vested with authority to cast us out of it; for to them were given "the keys of the kingdom of heaven (or the church), with assurance, that whatsoever they should bind on earth, should be bound in heaven; and whatsoever they should loose on earth, should be loosed in heaven." (Mat. xviii. 18.) As baptism is to be administered so long as there shall be persons to be enkindled under the ban NC of Christ, and the Lord's supper to be celebrated so long as it shall be the duty of elders to adhere to the standard of their leader and their head; and as it is likewise to be feared that there will never come a time when all Christians shall "walk worthy of the vocation wherewith they are called," it follows, that this power of the keys which was originally given to the apostles, must continue in the church through all ages, even unto the end of the world. But as we have seen, that it was not at first intrusted to all the disciples in common, as one of the privileges inestimable from their profession, and as no body of men can possibly transfer an authority of which they themselves were never possessed: it is certain, that even now it cannot, by the election of one class of Christians, be delegated to another, but must, by some mode of succession, be derived from the apostles, who were sent by Christ as he was sent by his Father. To argue from the origin of civil to that of ecclesiastical government, although not very uncommon, the Episcopalians seems extremely fallacious. Of the various nations of the world, many of the sovereigns may indeed derive their authority from the suffrages of their subjects; because in a state of nature, every man has an inherent right to defend his life, liberty and property; and what he possess'd in his own person, he may for the good of society transfer to another; but no man is by nature, or can make himself, a member of the Christian church; and therefore authority to govern that society can be derived only from him by whom it was founded, and who died that he might "gather together in one all the children of God."

Against such reasoning as this it hath been urged, that to make institutions, which like baptism and the Lord's supper are generally necessary to the salvation of all Christians, depend for their efficacy upon the authority or communion of a particular order, appears inconsistent with the wisdom and goodness of God; as by such an economy an intolerable domination would be established over the souls of men, and the purpose for which he the Saviour of the world died might be in some degree defeated by the caprice of an ignorant and arbitrary priesthood. The objection is certainly plausible; but the Episcopalians affirm, that either it has no weight, or militates with equal force against all religion, natural as well as revealed, and even against the providence of Providence in the government of the world. In every thing, he observes, relating to their temporal and to their spiritual interests, mankind are all subjected to mutual dependence. The rich depend upon the poor, and the poor upon the rich. An infant neglected from the birth, would barely cry and cease to live; nor is it easily to be conceived, that in the more rigid climates of the earth, a fall grown man could provide even the necessities of mere animal life.

Of religion, it is certain that in such a state nothing could be known; for there is not the smallest reason to imagine that any individual of the human race— an Aristophanes, a Bacon, or a Newton—had he been left alone from his infancy, without culture and without education, could ever, by the native vigour of his own mind, have discovered the existence of a God, or that such speculations as lead to that discovery would have employed any portion of his time or his thoughts. Even in civilized society it would be impossible, in the present age, for any man, without the assistance of others, to understand the very first principles of our common Christianity; for the scriptures, which alone contain those principles, are written in languages which are now no where vernacular. In the fidelity of translators, therefore, every literal disciple of Jesus must consider, for the truth of those doctrines which constitute the foundation of all his hopes; and as no man ever pretended that the Christian sacraments are more necessary to salvation than the Christian faith, the Episcopalians see no impropriety in inconsistency in making those persons receive baptism and the Lord's supper by the ministration of others, who, by such ministration, must of necessity receive the truths of the gospel.

By such arguments as these does the Episcopalian attempt to prove that Christ constituted some permanent order of ministers in the church, to whom in the external administration of religion the body of Christians are commanded to pay obedience; and thus far the Presbyterian agrees with him: but here their agreement ends. They hand in hand attack the Independent with the same weapons, and then proceed to attack each other. The one maintains, that originally the officers of the Christian church were all presbyters or elders of one order, and vested with equal powers; whilst the other holds, that Christ and his apostles appointed divers orders of ministers in the church; that these orders the highest alone was empowered to ordain others; and that therefore obedience, as to those who watch for our souls, can be due only to such as are episcopally ordained.

In behalf of the Presbyterian plea' it is urged, that The Presbyter the title bishop and presbyter, being in the New Testament indifferently given to the same persons, cannot plea. be the titles of civil ecclesiastical officers; which appears still more evident from the ordination of Timothy, who although he was the first Bishop of Ephesus, received his episcopal character by the imposition of the hands of the presbyters. That one and the same man is in the New Testament, styled sometimes a bishop and sometimes a presbyter, cannot be denied; but although every apostolic bishop was therefore undoubtedly a prebyster...
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Episcopalian, that every presbyter was likewise a bishop. In the Old Testament, Aaron and his sons are without any discrimination of order frequently styled priests; and in the New, both St Peter and St John call themselves presbyters, as St Paul, upon one occasion, styles himself a deacon—"Samos," (Ep. iii. 7.); yet no man ever supposed those abolos to have been such ecclesiastical officers as modern presbyters and deacons; and it is universally known that in the Jewish priesthood there were different orders, and that Aaron was of an order superior to his sons. This being the case, the presbyters, by the laying on of whole hands Timothy was made a bishop, may have been of the same order with St Peter and St John; and if so, it follows that his ordination was episcopal. At all events, we are certain, continues the advocate for Episcopacy, that it was not, in the modern sense of the word, Presbyterian; for the gift, which in the first epistle is said to have been "given by prophecy with the laying on of the hands of the presbytery," is in the second said to have been "in him by the putting on of the hands of St Paul." And here it is worthy of observation, that the preposterous used in the former case is ἵνα, which signifies concurrence rather than instrumentality; but that in the latter is συν, which, as every Greek scholar knows, is prefixed to the instrumental case by which anything is effected: so that whatever may have been the order of the presbyters who concurred, St Paul appears to have been the sole ordainer. But by the consecration of all parties, St Paul was a bishop in the highest sense in which that word is ever used; and the powers of the episcopate not being parcelled out among various partners, of whom each posses only a share, the imposition of his hands was sufficient for every purpose which could have been effected by the hands of the whole college of apostles.

It appears, therefore, that from the promissory use of the titles bishop and presbyter, and from the ordination of Timothy, nothing can with certainty be concluded on either side of this celebrated question. But if, instead of resting in mere words, which, when taken alone and without regard to the context, are almost all of ambiguous signification, we attend to some important facts recorded in the New Testament, the Episcopalian thinks we shall in them discover sufficient evidence that the government of the primitive church was presbyterial.

During our Saviour's stay upon earth, it is undeniable that he had under him two distinct orders of ministers—the twelve, and the seventy; and after his ascension, immediately before which he had enlarged the powers of the twelve, we read of apostles presbyters, and deacons, in the church. That the presbyters were superior to the deacons, and the deacons superior to both, is universally acknowledged; but it has been said that in scripture we find no intimation that the apostolic order was designed for continuance. A Quaker says the same thing of water-baptism; and the Episcopalian observes, that it would be difficult to point out by what passage of scripture, or what mode of reasoning, those who, upon this plea, reject the apostolic order of Christian ministers, could overthrow the principles upon which the disciples of George Fox reject the use of that rite which our Saviour instituted for the initiation of mankind into his church. They were the eleven alone to whom Christ said, "Go ye therefore and teach all nations, baptizing them in the name of the Father, and of the Son, and of the Holy Ghost:" and therefore, although we frequently find presbyters and deacons administering the sacrament of baptism, we must conclude, that as a judge administer judges by authority derived from his sovereign, so those inferior officers of the church administered baptism by authority derived from the apostles. Indeed, had they pretended to act by any other authority, it is not easy to be conceived how their baptism could have been the baptism instituted by Christ; for it was not with the external washing by whomever performed, but with the eleven and their successors, that he promised to be "always, even unto the end of the world."

That the eleven did not consider this promise, or the commission with which it was given, as terminating with their lives, is evident from their admitting others into their own order; for which they had competent authority, as having been sent by Christ as he was sent by his Father. When St Paul, to magnify his office, in the Galatians due reverence, styles himself, "an apostle not of men, neither by man, but by Jesus Christ and God the Father," he must have known some who derived their apostolic mission by man; other wise he could with no propriety have claimed particular respect, as he evidently does, from what was in his own apostleship no particular distinction. At that very early period, therefore, there must have been in the church secondary apostles, if they may be so called, upon whom, by imposition of hands, or by some other significant ceremony, the eleven had conferred that authority which was given to them by their Divine Master.

Such were Matthias and Barnabas; such likewise were Timothy, Titus, and the angles of the seven churches in Asia, with many others whose names and offices are mentioned in the New Testament.

That Matthias and Barnabas were of the apostolic order, has never been controverted; and that Timothy and Titus were superior to modern presbyters, is evident from the offices assigned them. Timothy was, by St Paul, empowered to preside over the presbyters and deacons, to receive accusations against them, to exact, to charge, and even to rebuke them; and Titus was, by the same apostle, left in Crete for the express purpose of setting things in order, and ordaining presbyters in every city. To exact, to charge, and with even power in Asia, bishops.

Three orders of Christian ministers during our Saviour's stay upon earth, and likewise after his ascension into heaven.

13 Episcopalian argument against it.

14 Three orders of Christian ministers during our Saviour's stay upon earth, and likewise after his ascension into heaven.
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Episcopacy, ed by St John were Christian high priests or bishops predating over more than one congregation, as it is affirmed by all the ancient writers, cannot, he thinks, be denied by any man who will take the trouble to compare scripture with scripture. We read (Acts xix. 10, and 20,) that "in the space of two years all they who dwelt in Acha heard from St Paul the word of the Lord Jesus, both Jews and Greeks; and that there the word of God grew mightily and prevailed; but with what truth or propriety this have been said, if at the time of St John's writing the Apocalypse, which was 30 years after St Paul's death, all the Christians of Proconsular Asia were comprised in seven congregations, which assembled, each with its proper pastor, to perform, in one place, the duties of public worship. In a word, the advocate for episcopacy infilts, that no man, that reads without prejudice the acts of the apostles, the epistles of St Paul, and the Apocalypse of St John, can seriously believe that Timothy, Titus, Ephodafort, Sillanus, and Silvanus, with the angels of the seven churches in Asia, were mere prebendaries, or that the government of the church was, in those days, by a college of elders.

When from the inspired penmen of the New Testament he proceeds to examine the succeeding writers of the Christian church, the Episcopalian finds such multiplied and concuring evidence of the apostolic institution of episcopacy, as he thinks it impossible to refilt without denying the truth of all ancient history, and even shaking the pillars of revelation itself; for "in the noble army of martyrs," the witnesses of the episcopal government of the church are earlier, and by far more numerous, than those who testify that the gospel of St. Matthew was written by that apostle, or that the book of the Apocalypse is canonical scripture. The authority of the fathers indeed is at present very low; but should they be allowed to be as fanciful divines and as bad critics as their worst enemies are pleased to represent them, this would detract nothing from their evidence when they bear witness to the constitution of the church in their own times; for of their integrity there can be no doubt: and what the Episcopalian wants of them is only their testimony to matters of fact which fell under the cognizance of their own senses, and the evidence of which, therefore, they could not be deceived. It is here indeed chiefly that he triumphs over his antagonists. In the second and third centuries there was no general council, nor any Christian sovereign. And presbytery therefore, he urges, could not have been universally introduced during that period, either by a concert among the clergy, or by the authority of the civil magistrate. Yet that even then there was no such church under heaven, of which the government was not episcopal, has been confounded by some of the most learned writers among the Presbyterians themselves; whence he concludes that episcopacy is of divine institution.

The candid Episcopalian, however, allows, that in the apostolic age there may have been some churches which at first had only bishops and deacons to perform the offices of religion; for when the number of disciples in any place was so small that they all could meet in one assembly, there was no necessity for any other order of ministers: but it appears that, from the very beginning, bishops, presbyters, and deacons, were settled in all the larger cities of the Roman empire; and it was episcopacy in those days an allowed maxim, that without a bishop, there could be no church. The better to understand the original state and institution of episcopacy, it is necessary to observe, that the empire which contained almost all the known part of the Christian world, was by Augustus Caesar divided into provinces, subjected each to the authority of one chief magistrate, who was commonly a prætor or procurator, and who resided in the metropolis or chief city of the province. A province comprehended the cities of a whole region; and in the age of the apostles, each city was under the immediate government of certain magistrates within its own body, known by the name of proconsul, or senator, or curia, "the states and court of the city." These magistrates were subordinate to the praetor or procurator; but among them there was one superior to the rest, called sometimes diktator, and sometimes dexter for civitas, whose jurisdiction extended not only over the city itself, but likewise over all the adjacent territory. That territory was denominated acropoliis, or the suburbs, and often reached to the distance of 10 or 12 miles round the city, and sometimes much farther, containing within it many villages and small towns under the government of the city magistrates. From some passages The origin in the New Testament, and from the concurred evi
dence of the earliest writers of the church, it appears to have been the purpose of the apostles to settle a bishop in every city where there was a civil magistrate: but as they could not be personally present in all places at once, it was natural for them to enter upon the great work of converting the nations, by first preaching the gospel in that city of each province which was the ordinary residence of the governor; because to it there must have been the greatest resort of people, who would carry the glad tidings with them into the country when they returned. Accordingly, having dispersed themselves over the empire, and made numbers of profelytes in the principal cities, they fixed in each, where they saw it necessary, a bishop, with a college of presbyters and deacons; and to give those bishops, who were at first called apostles, a commission, as the other cities in the province should be converted, to fix in them bishops also.

In some of the smaller cities, it is extremely probable that a bishop and a deacon were for a short time the only ecclesiastical officers, till the number of Christians increased so much as to make it impossible for them all to assemble in one house for the purposes of public worship. The bishop then ordained presbyters to officiate in those congregations where he himself could not be present, and to assist him in other parts of his pastoral office; but in all their ministrations the presbyters were subordinate to him, who was the chief pastor within the city, who composed the prayers which were offered up in public, and to whom all the other ministers of religion were accountable for their conduct. So long as the number of the faithful was confined within the walls of the city, it appears that the bishop with his presbyters and deacons lived together as in a college; that divine service was every Lord's day, or oftener, performed in what was afterwards called the cathedral or mother-church, by the bishop himself, assisted by some of his clergy; and that the congregations which met in other churches, having no fixed pastors,
Episcopacy priests, were supplied by such presbyters as the bishop chose to send them from his own church. Whilst matters continued in this state, the clergy had no other revenues than what arose from the voluntary oblations of the people; which were indeed so large as not only to support them with decency, but likewise to answer other ends of charity and munificence. They were commonly divided into four equal parts; of which one was allotted to the bishop, a second to the interior clergy, a third to the poor, and a fourth to keep the churches in repair; and it was considered as part of the bishop’s duty to take care that the offerings should be faithfully applied to these purposes.

The origin of parishes. When converts increased in number, and churches were built in the suburbs, each of those churches had a fixed pastor similar to a parish-priest among us; but still those priests, as well as the city clergy, ministered in subordination to the bishop, whose authority extended as far as the civil authority of the Roman magistrate, within which district or diocese it was supreme over all orders of Christians. This every man knows who is acquainted with ecclesiastical history; for the bishop alone could ordain priests and deacons, administer the rite of confirmation, absolve penitents who were under church-censure, and escape from communion heretics and notorious offenders; and from his sentence there lay no appeal but to a synod of provincial bishops.

Such synods were in each province convened by the bishop of the chief city; for the apostles having been careful to place in those cities men of the most eminent gifts and abilities, the other bishops of the provinces applied to them for advice upon every emergency, and paid a particular deference to them upon every occasion. So that though all bishops were of equal authority as bishops yet when they met to confederate a new bishop, or to deliberate upon the affairs of the church, they yielded a precedence to the bishop of the metropolis, who called them together, and who sat as president or moderator of the synod. Hence the origin of metropolitans or archbishops; whose authority was so considerable, that though there is not a doubt but the election of bishops was anciently placed in the clergy and people of the vacant diocese, yet the bishop elect could not be consecrated without the consent of the archbishop of the province.

In consequence of the extensive powers with which the primitive bishops were vested, they are commonly styled in the writings of those times presidents, provosts, or superiors of the church chief priests, princes of the clergy, and even princes of the people; but their authority was wholly spiritual. Thence prelates, imitating the example of their Divine Master when on earth, neither posse’d nor assumed to themselves any jurisdiction over the properties or civil rights of men. In consequence of St Paul’s having repriamend the Corinthians for going to law before the magistrates, they were indeed often chosen as arbiters of such civil disputes as arose between individuals under their episcopal government; but on these occasions they could not act unless the submission was voluntarily made by both the contending parties, and then their decision was final. When the empire became Christian, this privilege was confirmed to them by law; for any civil cause depending before a court of justice could be withdrawn, and by the mutual consent of parties be submitted to the arbitration of the bishop whose award, which in former times could be enforced only by the terror of church-censures, was then enforced by the peculiar magistrate. In criminal causes, where the trial might be for life or death, they were prohibited both by the canons of the church and by the laws of the state from acting as judges; and therefore they never suffered such causes to come before them, except when it was necessary that the person accused, if found guilty, should be excluded from the communion of the faithful. But they had so many civil causes flowing in upon them, that they were soon obliged to devolve part of that care upon other persons in whose knowledge, prudence, and integrity, they could fully confide; and as the persons employed to act in the bishop’s stead were often laymen, it has been conjectured that they gave rise to the office of lay-chancellor in the church, and to all that train of spiritual judges and spiritual courts against which such numbers are disposed to clamour.

Be this as it may, it is certain that, through the piety and munificence of the Christian emperors the bishops enjoyed large revenues and many valuable privileges; but it does not appear that they had any rank or authority, as barons or temporal princes, till the Gothic nations, which subdued the Roman empire, had embraced the Christian faith. As Christianity incapacitated the leaders of those tribes from officiating as chief priests at the religious rites which were usually celebrated at the opening of their public assemblies, and as the bishops came naturally to discharge that duty on such occasions, when they must have shone in the rank by shining in the functions of the chief. The situation in which they thus appeared at the opening of all political conventions, would enable them to join with much effect in the deliberations which ensued; and their superior knowledge, their sacred character, and their influence with the people, would soon acquire them power equal to their rank. They must therefore have been well entitled to demand admission into that council which was formed by the king and the lay-chiefs at the national assemblies: and as they balanced the authority of those chiefs, we cannot doubt that the king would be disposed to give the utmost effect to their claim. Accordingly we find the dignified clergy, who received large grants of land to be held on the fame tenures with the lands of the lay magistrates, presiding along with those magistrates in the provincial assemblies of every degree in all the Gothic nations, and enjoying every advantage in point of rank and authority in their national diets. Hence the bishop of Rome, and several bishops in Germany, have, like the dukes and marquises of that empire, been for a long time sovereign princes; and hence too the bishops of England and Ireland have always sat, and have an equal right with the lay-peers to sit in the upper house of parliament. It is, however, obvious, that so far as episcopacy is of apologetical foundation, those peers and princes posses not the original character in any higher degree than the bishops in America, who are barely tolerated, or than those in Scotland who do not enjoy that privilege; and that confirmation administered, or holy orders conferred, by a persecuted prelate, must be as effectual to the purposes of religion, as if given by a German prince or an English peer.
As we are not ourselves episcopalian, we have advanced nothing of our own; but have selected from English writers, who have at different times undertaken to defend the divine right of episcopacy, such facts and arguments as to appear to be of the most importance, or to have the greatest weight, without remarking upon them, or offering any answer. The reason employed to prove that the order of bishops was instituted by the apostles, is taken from a work prepared for the press by Dr Berkeley prebendary of Canterbury, and son of the celebrated bishop of Cloyne. For the refit of the detail, we are indebted chiefly to Bingham’s *Origines Ecclesiasticae*; a performance in great estimation with those English divines who are commonly known by the appellation of high churchmen. As editors of a work of this kind, it is not our business to be of any party, or to support, in opposition to all others, a particular church, though that church should be our own. We shall therefore treat independence and presidency as we have treated episcopacy, by employing some able writer of each society to plead his own cause. Mean white, we shall conclude this article with a few reflections, which, though they come from the pen of an obscure author, deserve to be engraved deep in the memory of every controvertist of every communion.

“On complicated questions (lais a late apologist for the episcopal church in Scotland), men will always differ in opinion; but conscious each of the weaknesses of his own understanding, and sensible of the bias which the strongest minds are apt to receive from thinking long in the same track, they ought to differ with charity and meekness. Since unhappily there are still so many subjects of debate among those who name the name of Christ; it is doubtful every man’s duty, after divesting himself as much as possible of prejudice, to investigate those subjects with accuracy, and to adhere to that side of each disputed question which, after such investigation, appears to him to be the truth; but he transcends the favourite precept of his divine Master, when he calls injurious reflections, or denounces anathemas, upon those who, with equal sincerity, may view the matter in a different light; and by his want of charity does more harm to the religion of the *Prince of Peace*, than he could possibly do good, were he able to convert all mankind to his own orthodox opinions.”

**EPISCOPAL** is, something belonging to Bishops. **EPISCOPALIANS**, in church-history, an appellation given to those who prefer the episcopal government and discipline to all others. See **EPISCOPACY**.

By the title, none but Episcopalians, or members of the church of England, are qualified to enjoy any office: We shall therefore treat *independence* and *presidency* as we have treated episcopacy, by employing some able writer of each society to plead his own cause. Mean white, we shall conclude this article with a few reflections, which, though they come from the pen of an obscure author, deserve to be engraved deep in the memory of every controvertist of every communion.

**EPISCOPUS**, the name with bishop. See **BISHOP** and **EPISCOPACY**.

**EPISODE**, in poetry, a separate incident, story, or action, which a poet inverts, and connects with his principal action, that his work may abound with a greater diversity of events; though in a more limited sense, all the particular incidents whereof the action or narration is compounded, are called *episodes*.

**EPISPASTIC**, in medicine, a topical remedy, which being applied to the external parts of the body, attracts the humours to that part.

**EPISTATES**, in the Athenian government, was the president of the procedure. See **PROFET**.

**EPISTEMONARCH**, in the ancient Greek church, an officer of great dignity, who had the care of every thing relating to faith, in the quality of censor. His office answered pretty nearly to that of master of the sacred palace at Rome.

**EPISTLE**, denotes the name with a missive letter; but is now chiefly used in speaking of ancient writings, as the epistles of St Paul, epistles of Cicero, epistles of Pliny, &c.

**EPISTLES and GOSPELS**, in the liturgy of the church of England, are select portions of scripture, taken out of the writings of the evangelists and apostles, and appointed to be read, in the communion-service on Sundays and holidays. They are thought to have been selected by St Jerome, and by him put into the lectionary. It is certain, that they were very anciently appropriated to the days whereon we now read them, since they are not only of general use throughout the western church, but are also commented upon in the homilies of several ancient fathers, which are said to have been preached upon those very days to which these portions of scriptures are now affixed.

The epistles and gospels are placed in an admirable order and method, and bear a special relation to the several days whereon they are read. The year is distinguished into two parts; the first being designed to commemorate Christ’s living among us, the other to instruct us to live after his example. The former takes in the whole time from advent to Trinity Sunday; the latter
EPITHELIALM, something belonging to an epitaph. See EPITHELIA.

EPITHELIALMUS. See ORATORY, n° 71.

EPITHELIA, a kind of omentum, or a mantle piece of stone or wood, laid immediately over the capital of a column.

EPITHELIALMUS (from ρηθη & πολυσ, and πολυθοσ & πολυσ), a monumental inscription, in honour or memory of a person deceased. It has been disputed whether the ancient Jews inscribed epitaphs on the monuments of the dead; but this is certain, that such monuments were erected in the name of deceased fathers and tribes. The Athenians, by way of epitaph, put only the name of the dead, with the epithet χειρος, signifying "good," or χοιρος "hero," and the word χειρος, signifying their good wishes. The name of the deceased father and his tribe were frequently added.—The Lacedemonians allowed epitaphs to none but those who had died in battle. The Romans infcribed their epitaphs to the manes, diles manibus; and frequently introduced the dead by way of prologopoeia, speaking to the living; of which we have a fine instance, worthy the Augustan age, wherein the dead wife thus bepeaks her surviving husband:

Immorta portis; sed tu, felicior, annos
   Foveo, conuex optime, vivom man.

The epitaphs of the present day are generally crammed with fullsome compliments which were never merited, characters which human nature in its best state could scarce lay claim to, and expressions of respect which were never paid in the life time of the deceased. Hence the proverb with great propriety took its rise, "He lies like an epitaph."—

EPITAPH, is also applied to certain eloges, either in prose or in verse, compos'd without any intent to be engraven on tombs; as that of Alexander,

Suffult buis tumulis, cat non suffictae arbis;
and that of Newton,

Itacem Newtoni,
Quem immortalis

The epitaph was the name of a paroxysm, particularly in a fever.

EPITHEMALMUS, in poetry, a nuptial song or composition in praise of the bride and bridegroom, praying for their prosperity, for a happy offspring, &c.

EPITHEMALMUS was sung amongst the Jews, at the door of the bride, by her friends and companions, the evening before the marriage. Psalm lxxv is an epitaphalum.

During the feast of the Jews, and attended with flowers and the offering of the feet to the bride. They returned in the morning, and with the same song, a little altered, eulogized them again. The evening song was called επιθεμαλμους, the morning salute was called επιθεμαλμους. This was the practice among the Romans also, but their epitaphalum was often obscene.

EPITHET, in pharmacy, a kind of fomentation, or remedy of a spirituous or aromatic kind, applied externally to the regions of the heart, liver, &c. to strengthen and comfort the same, or to correct some intemperance thereof.

EPITHET, in poetry and rhetoric, an adjective expressing some quality of a subject to which it is joined; or such an adjective as is annexed to substantives by way of ornament and illustration, not to make up an essential part of the description. Nothing, says Aristotle, is the reader more than too great a redundancy of epithets, or epithets placed improperly; and yet nothing is so essential in poetry as a proper use of them. The writings of the best poets are full of them.

EPITOME, in literary history, the same with ABRIDGEMENT.

EPITRITUS, in profody, a foot consisting of three long syllables and one short. Of these, grammarians reckon four kinds: the first consisting of an iambus and sponde, as satisitan, the second, of a trocheus and sponde, as cencis; the third, of a sponde and an iambus, as communian; and the fourth, of a sponde and trocheus, as incantatae. See the articles SPODEUS, TROCHEUS, &c.

EPITROPE, See ORATORY, n° 83.

EPITROPOUS, a kind of judge, or rather an arbitrator, which the Greek Christians under the dominion of the Turks eclairc in the several cities, to terminate the differences that arise among them, and avoid carrying them before the Turkish magistrates. See ARBITRATOR.

Anciently the Greeks used the term επιτρητος in the same sense as the Latin is did procurator, viz. for a commissioner or intendant. Thus the commissioners of provisions in the Persian army are called by Herodotus and Xenophon επιτρητος. In the New Testament, επιτρητος denotes the steward of a household, rendered in the vulgate procurator.

EPIZEUXIS, See ORATORY, n° 68.

EPHocha, in chronology, a term or fixed point of time whence the succeeding years are numbered or counted. See ERA.

EPODE, in lyric poetry, the third or last part of the ode, the ancient ode being divided into firephoe, antithope, and epode. See Ode, &c.

The epode was sung by the priests, standing still before the altar, after all the turns and returns of the firephoe and antithope, and was not confined to any precise number or kind of vershes.

The epode is now a general name for all kinds of little vershes that follow one or more great ones, of what kind
kind for ever they be; and in this sense, a pentameter is an epopea after an hexameter. And as every little verse, which, being put after another, closes the period, is called epode; hence the sixth book of Horace's odes is intitled libri epodes, "book of epodes," because the verses are all alternately long and short, and the short ones generally, though not always, close the sense of the long one.

EPPOPEIA, in poetry, the history, action, or fable, which makes the subject of an epic poem. The word is derived from the Greek έποπεια, "verse," and ως ἄφθα, "I make."

In the common use of the word, however, epopeia is the same with epos, or epic poem itself. See the article POETRY.

EPOPS, or HONOR. See UPUPA.

EPSOM, a town of Surrey, about 16 miles south-west from London, long famous for its mineral waters. These were discovered in 1618; and though not in such repute as formerly, yet they are not impaired in virtue, and the salt* made from them is famous all over Europe, for gently cleaning and cooling the body. The hall, galleries, and other public apartments are now run to decay; and there remains only one house on the spot which is inhabited by a countryman and his wife, who carry the waters in bottles to the adjacent places, and supply the demands of dealers in London. On the neighbouring downs are annually horse-races, but the inns, shops, and bowling-greens are not near so much frequented as formerly. The market is on Friday; fair, July 25. The town is about one mile and a half in circumference, from the church to the palace at Durdans, which was the as formerly. The market is on Friday; fair, July 25. The town is onceinhabited by its present Majesty's father. In Hadon's-Lane here was Epom-Court, an ancient Saxon seat, long since converted into a farm. Here are so many fields, meadows, orchards, gardens, and the like, that a stranger would be at a loss to know whether this was a town built in a wood, or a wood surrounded by a town.

Epsom water is easily imitated by art; i.e. by only dissolving half an ounce of Epsom salt in a quart of pure water, made somewhat brisk or quick by a few drops of spirit of vitriol and oil of tartar, so as to let the alkali prevail.

EPULARES, in antiquity, an epithet given to those who were admitted to the sacred epula or entertainments, it being unlawful for any to be present at them who were not pure and chaste.

EPULO, in antiquity, the name of a minifter of sacrifice among the Romans.

The pontifices, not being able to attend all the sacrifices performed at Rome to so many gods as were adored by that people, appointed three ministers, whom they called epulones, because they conferred on them the care and management of the epulae, feasts in the solemn games and fettivals. To them belonged the ordering and serving the sacred banquet, offered on such occasions to Jupiter, &c. They wore a gown bordered with purple like the pontifices. Their number was at length augmented from three to seven, and afterwards by Caesar to ten. Their first establishment was in the year of Rome 538, under the confulate of L. Furius Purpureus, and M. Claudia Marcellus.

EPULUM, in antiquity, a holy feast prepared for the gods in times of public danger. The feast was sumptuous, and the gods were formally invited and attended; for the statues were brought on rich beds furnished with soft pillows, called poluminariae. Thus accommodated, their godships were placed on their couches at the most honourable part of the table. The care of the epulon belonged to the epulon, and the gods were plentifully served with the richest dainties, as if they were able to eat; but the epulones performed that function for them, and doubts were competent proxies! No wonder that Pliny solicited Trajan to be admitted of their order.

EPULUM is also used to signify any solemn feast; so we meet with epulum feratus, "a funeral entertainment."

EQUALLE, an appellation given to such motions as always continue the same in degree of velocity, without being either accelerated or retarded.

EQUAL, a term of relation between two or more things of the same magnitude, quantity, or quality.

Mathematicians speak of equal lines, angles, figures, circles, ratios, solids.

EQUALITY, that agreement between two or more things, whereby they are denominated equal.

EQUANIMITY, in ethics, denotes that even and calm frame of mind and temper, under good or bad fortune, whereby a man appears to be neither puffed up nor overjoyed with prosperity, nor dispirited, forlorn, or rendered uneasy by adversity.

EQUATIONS, in algebra. See ALGEBRA, chap. iii.

Equation of Time, in astronomy and chronology, the reduction of the apparent time or motion of the sun, to equable, mean, or true time. See ASTRONOMY, n° 383.

EQUATOR, or EQUATOR, in astronomy and geography, a great circle of the sphere, equally distant from the two poles of the world, or having the same poles with those of the world. It is called the equator, because when the sun is in it the days and nights are equal; whence also it is called the equinoccial; and when drawn on maps and planispheres, the equinoccial line, or simply the line. Every point of the equator is a quadrant's distance from the poles of the world; whence it follows, that the equator divides the sphere into two hemispheres, in one of which is the northern, and in the other the southern pole.

EQUITO, or Equitorial INSTRUMENT. See ASTRONOMY, n° 499, 504.

EQUITY, or Equerry, a grand stable or lodge for horses, furnished with all the conveniences thereof; as stables, manger, rack, &c. The word is formed from the French escurie, which signifies the same thing. Some again derive escurie from the Latin Scura, which not only denotes a place for beasts to be put up in, but also a grange or barn. But a more probable derivation is from equitum "a stable for horses," of equus "horse." Some hold that the word stable, in propriety, relates only to bullocks, cows, sheep, hogs, &c. and escurie, to horses, mules, &c.

A simple escurie is that provided for one row of horses; a double escurie that provided for two; with a pittance in the middle, or two pinnages; the horses being placed head to head, as in the little escurie at Versailles.
Under equery, the term is also comprehended the
lodgings and apartments of the equery, grooms,
and servants (Equerry), is also an officer who has the
care and management of the horses of a king or prince.

**EQUERIES** or **Equeries**, popularly called Querry,
are particularly used in Britain for officers of the
king's stables, under the master of the horse, seven in
number, who, when his majesty goes abroad, ride in
the leading coach, and in waiting one of the time monthly,
and have a table with the gentlemen-ushers throughout
during the time, and a salary of L. 300 a-year each. They
used to ride on horseback by the coach-side when the
king travelled; but that being more expensive to them
than necessary to the sovereign, it has been dis-
continued.

**Equery of the Crown Stable** have that appellation,
as being employed in managing and breaking the
faddle-horses, and preparing them for the king's riding.
There are two in number; the first having an annual
salary of L. 360, and the second L. 200, whereof one
is, or always should be, in close waiting at court; and
when his majesty rides, holds the stirrup, while the
master of the horse, or one of the equeries in his ab-
scence, afflict in mounting him; and when his majesty
rides, they usually attend him.

**Equies**, in antiquity. See **Equestrian Order**,
and **Equities**.

**Equus Auratus**, is used to signify a knight-bachelor,
called auratus, q. d. gilt, because anciently none but
knights might gilt or beautify their armour or their habilities
of war with gold. In law this term is not used, but instead of it
"knight", and sometimes "cavalier."

**Equestria**, among the Romans, a place in the
theatre where the equites or knights sat.

**Equestrian** (Eques), a term chiefly used in the
phrase equestrian status, which signifies a status re-
presenting a person mounted on horseback. The word is
formed of the Latin equus, "horse, horeman," of
equis, "horse."

**Equestrian Games**, among the Romans, horse-races,
which there were five kinds, the pedromos or plain bo: c race, the chariot-race, the chariot-race about fun-
nal piles, the indi festivales, and the indi nepotales.

**Equestrian Order**, among the Romans, signified
their knights or equites; as also their troopers or
horemen in the field; the first of which orders flour
in contradiflinction to the senators; as the left did to
the foot, military, or infantry. Each of these dif-
fitions was introduced into the state by Romalus.

**Equinangular**, in geometry, an epithe given
to figures whose angles are all equal; such are a square,
an equilateral triangle, &c.

**Equidistant**, an appellation given to things
placed at equal distances from some fixed point or place
of which they are referred.

**Equilateral**, in general, something that has
equal sides; as an equilateral triangle.

**Equilibrium**, in mechanics, is when the two
ends of a lever or balance hang so exactly even and
level, that neither doth ascend or descend, but both
keep in a position parallel to the horizon; which is
accomplished by their being both charged with an equal
weight.

**Equimultiples**, in arithmetic and geometry, Equimulti-
ples are numbers or quantities multiplied by one and
the same number or quantity. Hence, equimultiples are
always in the same ratio to each other as the simple
quantities before multiplication, thus, if 6 and 8 are
multiplied by 4, the equimultiples 24 and 32 will be
to each other as 6 to 8.

**Equinoctial**, or **Equinocial**, in astronomy,
a great and immovable circle of the sphere, under
which the equator moves in its diurnal motion.

The equinoctial or equinocial line, is ordinarily con-
ounded with the equator: but there is a difference;
the equator being moveable, and the equinocial im-
moveable; and the equator being drawn about the con-
venx surface of the sphere, but the equinocial on the
concave surface of the magnus orbis.

Whenever the sun in his progress through the ecliptic
comes to this circle, it makes equal days and nights all
around the globe; as then rising due east and sett-
ing due west, which he never does at any other time
of the year. And hence the denomination from æquus
and nox, "night," quis aequat diem notit.

The equinocial then is the circle which the sun de-
scribes, or appears to describe, at the time of the equi-
noctes; that is, when the length of the day is every
where equal to that of night, which happens twice a
year. See **Equino**.

**Equinoctial**, in geography. See **Equator**.

The shadows of those who live under this circle are
cast to the southward of them for one half of the year,
and to the northward of them during the other half;
and twice in a year, viz. about the equinoxes, the sun at
noon casts no shadow, being in their zenith.

From this circle is the declination or latitude of
places accounted in the degrees of the meridian.

**Equinoctial Points**, are the two points wherein the
equator and ecliptic intersect each other; the one be-
ing in the first point of Aries, is called the vernal point
or equinox; and the other in the first point of Libra,
the autumnal point or equinox.

**Equinoctial Dial**, is that whole plane lies parallel
to the equinoctial. See **Dial**.

**Equinox**, or **Æquinoc**, in astronomy, the time
when the sun enters one of the equinoctial points.

The equinoxes happen when the sun is in the equi-
noctial circle; when of consequence the days are equal
to the nights throughout the world, which is the case
three a year, viz. about the 20th of March, and the
23rd of September, the first of which is the vernal and
the second the autumnal equinox.

It is found by observation, that the equinoctial
points, and all the other points of the ecliptic, are
continually moving back ward, or in antiquedentia, that is,
westward. This retrograde motion of the equinoctial
points, is that famous and difficult phenomenon cal-
ed the *precession of the equinoxes*. See **Astronomy**,
no 349.

**Equire**, in the military art, denotes all sorts
of utensils, artillery, &c. necessary for commencing and
prosecuting with safety and success any military opera-
tions. Camp and field equipment consists of tents,
field-furniture, saddle-horses, baggage, waggons,
and hore; &c.

To **equip**, in naval language, a term borrowed
from the French marine, and frequently applied to the
business
EQUIPOLLENCE, in logic, is when there is an equivalence between any two or more terms or propositions; i.e., when they signify one and the same thing, though they express it differently. Such propositions, &c. are said to be equivalent.

EQUIRIA, in antiquity, a festival instituted by Romans, and celebrated on the 27th of February, in honour of Mars, at which there were horse-races.

EQUISETUM, HORSE-TAIL: A genus of the order of filices, belonging to the cryptogamia class of plants; and in the natural method ranking under the frutic order, Conifera. There is a spike of peltated or shielded fructifications opening at the base. There are seven species; of which the most remarkable are, 1. The fylvaticum, or wood horse-tail. It grows in woods and moist shady places in many parts of England and Scotland. The stalk rises from 12 to 18 inches high, angular, and rough to the touch; the angles being edged with sharp spiculae, scarce visible without a microscope. The leaves grow verticillate, 12 or more in a whorl, and these whorls are about an inch distant from one another. The leaves are very slender nearly quadrangular, about five inches long, pendent, and befit with several other exceedingly sharp spines, so that it resembles a pinto-tree in miniature. Horses are very fond of this plant, and in some parts of Sweden it is collected to serve them as winter food. 2. The arvensis, or common or corn horse-tail, grows in wet meadows and cornfields. The most remarkable property of this is, that its seeds, when viewed by a microscope, are seen to leap about as if, they were animated. It has a very astringent and diuretic quality, and has been esteemed serviceable in the hamaturia and gonorrhœa, but is disregarded by the present practice. It is a troublesome plant in pastures; and difagreeable to cows, being never touched by them unless they are compelled by hunger, and then it brings on an intractable diarrhoea. It does not seem to affect horses or sheep.

3. The palusire, marsh horse-tail, or paddock pipe, is frequent in marshes and ditches. It is not so rough as the former, but is likewise prejudicial to cattle. 4. The fluvatilis, or great river horse-tail, is frequently in flady marshes, and on the banks of stagnant waters. It is the largest of all the species, growing sometimes to the height of a yard, and near an inch in diameter. Haller tells us, that this kind of equisetum was eaten by the Romans; and Linneus affirms, that oxen and rein-deer are fond of it, but that horses refuse it. 5. The hyemale, rough horse-tail, have-grass or Dutch rush. This is much used by the white farmers and cabinet makers, under the name of Dutch Ruffles, for polishing, their metals and wood. All the other species will answer this purpose in some degree, but the last better than any of the rest. In Northumberland the dairy-maiden scour and clean their milk-pails with it. Some imagine, that if cows are fed with this species, their teeth will fall out.

EQUITES, amongst the Romans, were persons of the second degree of nobility, immediately succeeding the senators in point of rank. The equites or knights were required to be possessed of 400 sesterces before they could be admitted into that order; and when the knights were so reduced as to fall short of the prescribed revenue, they were expelled out of the eques-

EQUITY, in general sense, the virtue of treating all other men according to reason and justice, or as we would gladly be treated ourselves when we understand aright what is our due. See JUSTICE.

EQUITY, in jurisprudence, is defined a correction or qualification of the law, generally made in that part wherein it faileth or is too severe. It likewise signifies the extention of the words of the law to cases unexpressed, yet having the same reason; so that where one thing is enacted by statute, all other things are enacted that are of the like degree. For example, the statute of Gloce. gives action of waste against him that holds lands for life or years; and by the equity thereof, a man shall have action of waste against a tenant that holds but one year, or one half-year, which is without the words of the act, but within the meaning of it; and the words that enact the one, by equity enact the other. So that equity is of two kinds. The one abridges and takes from the letter of the law: the other enlarges and adds to it; and statutes may be construed according to equity, especially where they give remedy for wrong, or are for expedien of justice. Equity seems to be the interposing law of reason, exercised by the lord chancellor in extraordinary matters to do equal justice; and by supplying the defects of the law, gives remedy in all cases. See CHANCERY.

EQUITY, in mythology, sometimes confounded with justice, a goddess among the Greeks and Romans, represented with a sword in one hand and a balance in the other.

EQUIVALENT, is understood of something that is equal in value, force, or effect, to another. Equivalence is of various kinds, in propositions, in terms, and in things.

EQUIVALENT Propotions. See EQUIPOLLENCE.

EQUIVALENT Terms are where several words that differ in sound have yet one and the same signification; as every body was there, and nobody was absent, ukil, non, and omne.

EQUIVALENT Things, are either moral, physical, or statistical. Moral, as when we say that the commanding or advising a murder is a guilt equivalent to that of the murderer. Physical, as when a man who has the strength...
EQUUS

EQUIVOCAL terms or words, among logicians, are those which have a doubtful or double meaning. According to Mr. Locke, the doubleness and uncertainty of words has its cause more in the ideas themselves than in any incapacity of the words to signify them; and might be avoided, would people always use the same term to denote the same idea or collection of ideas; but, adds he, it is hard to find a discourse on any subject where this is the case; a practice which can only be imputed to folly or great dishonesty; since a man, in making up his accounts, might with as much fairness use the numeral characters sometimes for one sometimes for another collection of units.

EQUIVOCAL GENERATION, the production of animals without the intercourse between the sexes, by the influence of the sun or stars, &c.

This kind of generation is now quite exploded by the learned.

EQUIVOCATION, the using a term or expression that has a double signification. Equivocation are expedients to evade telling the truth, and yet without telling a falsity. The fathers are great patrons of equivocations and mental reservations, holding that the use of such shifts and ambiguities is in many cases allowable.

EQUELEUS; or Ecculas, in antiquity, a kind of rack used for extorting a confession, at first chiefly practised on slaves, but afterwards made use of against the Christians.

The equuleus was made of wood, having holes at certain distances, with a screw, by which the criminal was stretched to the third, sometimes to the fourth, or fifth holes, his arms and legs being fastened on the equuleus with cords; and thus was hoisted aloft, and extended in such a manner, that all his bones were dislocated. In this state red-hot plates were applied to his body, and he was goaded in the sides with an instrument called angula.

EQUUS, Equiculus, and Equus Minor, the horse’s head in astronomy, a constellation of the northern hemisphere, whose stars in Ptolemy’s catalogue are 4th, in Tycho’s 4th, in Hevelius’s 6th, and in Mr. Flamsteed’s 8th.

EQUUS, in zoology, a genus of quadrupeds belonging to the order of balaenae. This genus comprehends the horfe, the mule, the as, the zebra, and the quagga: they have fixed eret and parallel fore-teeth in the upper jaw, and six somewhat prominent ones in the under jaw: the dog-teeth are solitary, and at a considerable distance from the rest; and the feet consist of an undivided hoof.

1. The caballus, or Horse, has a long flowing mane, and the tail covered on all parts with long hairs.

The horse in a domestic state, is a bold and fiery animal; equally intrepid as his master, he faces danger and death with audacity and magnanimity. He delights in the noble and tumult of arms, and seems to feel the glory of victory; he excels in the chase; his eyes sparkle with emulation in the course. But though bold and intrepid, he is docile and tractable: he knows how to govern and check the natural vivacity and fire of his temper. He not only yields to the hand, but seems to consult the inclination of his rider. Constantly obedient to the impressions he receives, his motions are entirely regulated by the will of his master. He delivers up his whole powers; he refuses nothing; he will rather die than disobey. Who could endure to see a character so noble abused! who could be guilty of such gross barbarity!

This character, though natural to the animal, is in some measure the effect of education. His education commences with the toil of liberty, and is finished by constraint. The slavery of the horse is so ancient and so universal, that he is but rarely seen in a natural state. Several ancient writers talk of wild horses, and even mention the places where they were to be found. Herodotus takes notice of white savage horses in Scythia; Aristotle says they were to be found in Syria; Pliny, in the northern regions; Strabo, in Spain and the Alps. Among the moderns, Carden says, that wild horses are to be found in the Highlands of Scotland and the Orkney Isles; Olanius, in Muscovy; Dapper, in the island of Cyprus; Leo and Marmol, in Arabia and Africa, &c. But as Europe is almost equally inhabited, wild horses are not to be met with in any part of it; and those of America were originally transported from Europe by the Spaniards; for this species of animals did not exist in the new world. The Spaniards carried over a great number of horses, left them in different islands, &c. with a view to propagate that useful animal in their colonies. These have multiplied incredibly in the vast deserts of those thinly peopled countries, where they roam at large without any restraint. M. de Salle relates, that he saw, in the year 1685, horses feeding in the meadows of North America, near the bay of St. Louis; which were so ferocious that no body durst come near them. Oexelmans says, that he has seen large troops of them in St. Domingo running in the valleys: that when any person approached, they all stopped; and one of them would advance till within a certain distance, then lower with his nose, take to his heels, and the whole troop after him. Every author who takes notice of these horses of America agree that they are smaller and less handsome than those of Europe. These relations sufficiently prove, that the horse, when at full liberty, though not a fierce or dangerous animal, has no inclination to associate with mankind; that all the softness and docility of his temper proceeds entirely from the culture and polish he receives in his domestic education, in which all his faculties commence as soon as he is brought forth.

The motions of the horse are chiefly regulated by the bit and the spur; the bit informs him how to direct his course, and the spur quickens his pace. The mouth of the horse is endowed with an amazing sensibility: the slightest motion or pressure of the bit gives him warning, and infinitely determines his course. The horse has not only a grandeur in his general appearance, but there is the greatest symmetry and proportion in the different parts of his body. The regularity and proportion of the different parts of the head gives him an air of lightness which is well supported by the strength and beauty of his chief. He crests his head,
The horse is in a condition to propagate; and the mare, like most other females, is ready to receive him still sooner. But the foals produced by such early embraces are generally ill-made and weakly. The horse should never be admitted to the mare till he is four or four and a half: this is only meant with regard to draught-horses. Fine horses should not be admitted to the mare before they be six years old; and Spanish stallions not till seven. The mares are generally in season from the beginning of April to the end of June; but their chief ardour for the horse lasts but about 15 or 20 days, and this critical season should always be embraced. The stallion ought to be found, well made, vigorous, and of a good breed. For fine saddle-horses, foreign stallions, as Arabians, Turks, Barbs, and Andalusians, are preferable to all others. Next to these, British stallions are the best; because they originally sprang from thence abovementioned, and are very little degenerated. The stallions of Italy, and especially the Neapolitans, are very good. The best stallions for draught or carriage horses, are those of Naples, Denmark, Holstein, and Fretzeland. The stallions for saddle-horses should be from 14 to 15 hands high, and for draught horses at least 15 hands. Neither ought the colour of stallions to be overlooked; as a fine black, grey, bay, forre, &c. Besides these external qualities, a stallion ought to have courage, tractability, spirit, agility, a sensible mouth, sure limbs, &c. These precautions in the choice of a stallion are the more necessary, because he has been found by experience to communicate to his offspring almost all his good qualities, whether natural or acquired.

The mare contributes less to the beauty of her offspring than the stallion; but the contributions perhaps in other quadrupeds, who lie during this operation. They continue to bring forth till the age of 16 or 18 years; and both horses and mares live between 25 and 30 years. Horses cast their hair once a year, generally in the spring, but sometimes in the autumn. At this time they are weak, and require to be fed and taken care of than at any other season.

In Persia, Arabia, and most eastern countries, they never geld their horses, as is done in Europe and China. This operation generally diminishes their strength, courage and spirit; but it makes them good humoured, gentle, and tractable. With regard to the time of performing this operation, the practice of different countries is different: some geld their horses when a year old, and others at 18 months. But the best and most general practice is to delay the operation till they be two years old at least: because, when the gelding is delayed for two years or more, the animals retain more of the strength and other qualities which naturally belong to the male.

As the utility of horses surpasses that of all other quadrupeds, it may be of use to subjoin some marks by which the age and other properties of horses may be distinguished.

In old horses, the eye-pits are generally deep; but this is only an equivocal mark being also found in young horses begot by old stallions. The most certain knowledge of the age is to be obtained from the teeth. Of these a horse has 40; 24 grinders or double-teeth, four tusks, and 11 fore-teeth: mares have no tusks, or at least very short ones. It is not from the grinders that we know the age, it is discovered first by the fore-teeth, and afterwards by the tusks. The two fore-teeth begin to grow within 12 days after the colt is foaled. These first, or foal-teeth, are round, hard, not very solid, and are cast at different times, to be replaced by others. At the age of two years and a half, the four middle fore-teeth are cast, two in the upper jaw, and two in the lower. In one year more, four others drop out; one on each side of the former, which are already replaced. When he is about four years and a half old, he sheds four others, and always next to those which have fallen out and been replaced. These four foal-teeth are replacable by four others, but are far from growing so fast as those which replaced the eight former, and are called the corner teeth; they replace the four left foal-teeth, and by these the age of the horse is discovered. They are easily known, being the third both above and below, counting from the middle of the jaw. They are hollow and have a black mark in their cavity. When the horse is four years and a half old, they are scarce visible above the gum, and the cavity is very sensible: at six and a half, they begin to fill; and the mark continually diminishes. Nor are these external contracts till seven or eight years, when the cavity is quite filled up, and the black spot effaced. After eight years, these teeth ceasing to afford any knowledge of the age, it is judged of by the tusks: which are four teeth adjoining to those last mentioned; and, like the grinders, are not preceded by any other teeth. The two in the lower jaw usually begin to grow at three years and a half, and those of the upper jaw at four; continuing very sharp-pointed till fix. At 10, the upper feem blunted, worn out, and long, the gum contracting itself as its years increase; the barer therefore they are, the older is the horse. From 10 to 13 or 14 years, little can be seen to indicate the age; but at that time some hairs of the eye-brows begin to turn grey. This mark, however, is equivocal, like that drawn from the depth of the eye-pits; horses from old stallions or mares, having grey hairs in the eye-brows when they are not above nine or ten years old. In some horses the teeth are of such a hardnes as not to wear; and in such the black mark always subsists, being never effaced by time; but the age of these horses, which are called deguts by the French, is easily known, the hollow of the tooth being filled up; and at the same time the tusks very long. It has been farther observed, that this is more common in mares than in horses. The age of a horse may be also known, though less accurately,
When the horse's back is short in proportion to his bulk, and his neck should sink a little below the withers, but the other parts should be straight, and no higher behind than before. He should also be home-rubbed; but the flout ribs should not approach too near the haunches, and then he will have room to fetch his breath. When a horse's back is short in proportion to his bulk, and yet otherwise well limbed, he will hold out a journey, tho' he will travel slow. When he is tall, at the same time with very long legs, he is but of little value.

The wind should never be overlooked in the choice of a horse: and it may easily be known by his flanks, if he is broken-winded, when he stands quiet in the stable; because he always pinches them in with a very slow motion, and drops them suddenly. A thick-winded horse fetches in breath often, and sometimes rattles and wheezes. This may be always discovered when he is set to bridle exercises.

The temper of the horse should always be observed; a vicious horse generally lays his ears close to his pole, shows the whites of his eyes, and looks full and dogged. An angry horse may be known by his frowning look; and he generally seems to stand in a posture of defence; when he is very vicious, he pays no regard to the groom that feeds him: However, some horses that are ticklish will lay back their ears, and yet be of a good disposition. A fearful horse is apt to start, and never leaves it off till he is old and restless. A fretful horse is very unfit for a journey: and you may discover his temper as soon as he gets out of the stable. A dull, heavy, flagging horse may be easily known, whatever tricks are used to route his spirits.

With regard to the colour of a horse, the bright bay, and indeed all kinds of bays in general, are accounted good colours. The chestnut horse is generally preferable to the forrcl, unless the former happens to be bauld, or party-coloured, with white legs. Brown horses have generally black manes and tails, and their joints are of a rusty black. Those of this colour that are dappled, are much handomer than the rest. Horses of a shining black, and well marked, without too much white, are in high esteem for their beauty. A flar, or blaze, or white muzzle, or one or more feet tipp'd with white, are thought to be rather better than those that are quite black.

Of greys, the dappled are accounted best; though the silver grey make a more beautiful appearance, and often prove good. The iron grey with white manes and tails are thought not to be so hardy. Greys of every kind will turn white sooner or later; but the name grey, when the dappled parts incline to bay or chestnut, are said to be good hardy horses. Roan horses have a diversity of colours mixed together; but the white is more predominant than the rest. They are all generally hardy and fit for the road; and some are exceeding good. Tho' of a strawberry colour most resemble the forrel, and they are often marked with white on the face and leg. When the bay is blended with it, he seems to be tinctured with clearer; and some of these prove to be very good. Dun, fallow, and
cream-coloured horses have a lift down their backs; and their manes and tails are black. Don horses are seldom chanced by gentlemen, and yet they may be very useful to the country farmer. The fellow and cream-coloured are more esteemed, both for beauty and use. Those horses that are finely spotted with gay colours like leopards are a great rarity, and for that reason are only in the hands of men.

There is some difference in horses according to the different countries where they are bred. For instance, in France, those of Bretagne are pretty strong made, and have generally black hair, or brown bay; and they have good legs and feet, with a hardy mouth, and a head short and fliny; but in general they are pretty clumsy. The horses of Franche Comté are said to have the legs of tigers, and the belly of a hind; but they are short and thick, and of a middle size; being much more proper for drawing than riding. The horses of Germany are not unlike those of Spain; but they are not so handomely nor so active, and therefore they are more proper to draw carriages. The Limousin horses are very vicious, and are good for little till they are six years old. Their colour is generally bay, or a bay brown. The horses of Normandy are much like that of Bretagne; and those of Poitou have good bodies, legs, feet, and eyes; but they are far from being handomely. The horses of Germany are much better and more handomely than those of the Low Countries. They are of great use for carriages; but much more for the army, and for drawing the artillery. They have a great deal of hair, especially about the legs. They are not large, but they are well fed; and yet they have tender feel. The Hungarian horses are excellent for the coach, as well as for riding; but they are large, though well proportioned; and they are of all colours, and in general very swift.

The Danish horses are low, short, and square; but they have a fine head, and short hair. The horses of the Low Countries are very fit for the coach, and they are best known by the name of Flanders-mares. The Polish horses are like the Danish; only they have not so fine a fore-head; their colour is generally a bright bay, and that of the outside peel of an onion; and they are fiery and vicious. The horses of Switzerland are pretty much like those of Germany; which is no wonder, since the Germans purchase a great number of them. The horses of Piedmont are fiery, of a middle size, and of all sorts of colours; their legs are good and handomely, their eyes fine, their ears small, and their mouths good; but they do not carry their heads well.

The horses of Naples and Italy are generally ill-made and lean; and yet they are good and useful, for they are light and proper for racing, though not for a long course; they never do well in a colder climate. The Spanish horses are very well made and handomely, as well as very active and nimble; they have good eyes, handomely legs and heads, and are easily managed; they are also good for racing, if they are well kept; however, they are not so good in northern climates as in their own country. The Turkish horses are of different shapes; but they are generally swift, tho' their mouths are bad. Most of them are white; tho' there are other colours; and they are large, hardy, strong, and fit for the road.

The horses of Barbary, commonly called barbs, have strong hocks, and are more proper for racing than any others whatever: some have said they never grow old, because they preserve their vigour to the last. They are excellent stallions; and some of them are used as such in Britain: however, the Arabian horses are not quite so good as the Barbary, though some think they are both of the same kind; only those that are used to the deserts of Arabia are always in action. The horses of the Gold Coast of Guinea are very few in number, and in other parts of that coast there are none at all; for many of the negroes, when they have been first brought over to the West Indies have expected great admiration at the sight of a horse, and even been afraid to come near one.

The horses of the Cape of Good Hope were originally brought from Peru; and they are generally small, and of a cheafful colour; for those that are natives of that country are all wild, and could never yet be tamed. The horses of China are good, and more particularly those in the province of Yun Nan; for they are very vigorous, though a little low. The horses of the Eluth Tartars are good and full of fire; and their size is much the same as the Polih horses: they are afraid of nothing; not even of lions and tigers: but perhaps this may be owing to use. In the country of the Mogul they are very numerous, and of all colours; they are generally of the middle size, though there are some as large and as handomely as those in Europe. The wild horses of Tartary differ very little from the tame; but they are so swift, that they avoid the arrows of the most skillful hunters.

The breed of horses in Great Britain is as mixed as that of its inhabitants; the frequent introduction of foreign horses has given a variety that no single country can boast of; most other countries produce only one kind; while theirs, by a judicious mixture of the several species, by the happy difference of soils, and by superior skill in management, may triumph over the rest of Europe in having brought each quality of this noble animal to the highest perfection.

In the annals of Newmarket may be found instances of horses that have literally outstripped the wind, as the celebrated M. Condallille has lately shown in his remarks on those of Great Britain. Childers is an amazing instance of rapidity; his speed having been more than once exerted equal to 82½ feet in a second, or near a mile in a minute.

The species used in hunting, is a happy combination of the former with others superior in strength, but inferior in point of speed and lineage: an union of both is necessary; for the fatigue of the chase must be supported by the spirit of one, as well as by the vigour of the other.

No country can bring a parallel to the strength and size of British horses defined for the draught; or to the activity and strength united of those that form their cavalry. In London, there are instances of single horses that are able to draw on a plain, for a small space, the weight of the three tons; but could with ease, and for a continuance, draw half that weight. The pack-horses of Yorkshire, employed in conveying the manufactures of
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of the country to the most remote parts of the kingdom, usually carry a burden of 420 pounds, and that indifferent over the highest hills of the north, as well as the most level roads. But the most remarkable proof of the strength of British horses, is to be drawn from that of their mill horser of these will carry at one haul 13 measures, which at a moderate computation of 70 pounds each, will amount to 91; a weight superior to that which the French, a great superiority both of strength and activity : the enemy was broken through by the impetuous charge of the squadrons; while the German horses, from their great weight and inactive, were unable to second their efforts, though those troops were actuated by the ne plus ultra ardor.

The present cavalry of Britain only supports its ancient glory. It was eminent in the earliest times; the feythed chariots, and the activity and good discipline of their horses, even struck terror into Caesar's legions: and the Britons, as soon as they became civilized enough to coin, took care to repress on their money the animal for which they were so celebrated. It is now impossible to trace out this species: for though they exist among the indigene of Great-Britain, such as the little horses of Wales and Cornwall, the hobble of Ireland, and the stiles of Scotland, though admirably well adapted to the uses of those countries, could never have been equal to the work of war: but probably they had even then a larger and stronger breed in the more fertile and luxuriant parts of the island, Those employed for that purpose, or for the draught, are an offspring of the German or Flemish breed, meliorated by the soil and a judicious culture.

The English were ever attentive to an exact culture of these animals, and in very early times set a high value on their breed. The effect of this care was held in by foreigners so long ago as the reign of Athelstan, may be collected from a law of that monarch, prohibiting their exportation, except they were designed as presents. These must have been the native kind, or the prohibition would have been needless; for commerce was at that time too limited to receive improvement from any but the German kind, to which country their own breed could be of no value. But when the intercourse with the other parts of Europe was enlarged, they soon laid hold of the advantages this gave of improving the breed. Roger de Beleme, earl of Shrewsbury, is the first that is on record: he introduced the Spanish stallions into his estate in Powisland, from which that part of Wales was for many ages celebrated for a swift and generous race of horses. Giraldus Cambrensis, who lived in the reign of Hen. II. takes notice of it; and Michael Drayton, contemporaneous with Shakespear, sings their excellence in the fifth part of his Polyolbion. This kind was probably destined to mount the gallant nobility, or courageous knights for fears of chivalry, in the generous contests of the tiltyard. From these sprung, to speak the language of the times, the flower of couriers, whose elegant form added charms to the rider, and whose activity and managed dexterity gained him the palm in that field of gallantry and romantic honour.

The increase of inhabitants, and the extent of the manufactures, together with the former neglect of internal navigation to convey those manufactures, multiplied the number of horses: an excess of wealth, before unknown in these islands, increased the luxury of carriages, and added to the necessity of an extraordinary culture of these animals: their high reputation abroad has also made them a branch of commerce, and proved another cause of their vast increase.

The all-wise Creator hath finely limited the several services of domestic animals towards the human race; and ordered that the parts of such, which in their lives have been the most useful, should after death contribute the least to our benefit. The chief use that the exuvia of the horses can be applied to, is for collars, traces, and other parts of the harness; and thus, even after death, he preserves some analogy with his former employ. The hair of the mane is of use in making wigs; of the tail, in making the bottoms of chairs, floor-cloths, and chokers: and to the anger in making lines.

TECHNICAL DESCRIPTION of the Parts of a Horse. Plate The Fore Part. 1. The forehead. 2. The temples. 3. Cavity above the eye. 4. The jaw. 5. The lips. 6. The nostrils. 7. The tip of the nose. 8. The chin. 9. The beard. 10. The neck. 11. The mane. 12. The fore-top. 13. The throat. 14. The withers. 15. The shoulders. 16. The chest. 17. The elbows. 18. The arm. 19. The plate vein. 20. The chefnt. 21. The knee. 22. The flank. 23. The main tendents. 24. The fetlock joint. 25. The fetlock. 26. The pattern. 27. The corona. 28. The hoof. 29. The quarters. 30. The toe. 31. The heel.—The Body. 32. The reins. 33. The fillers. 34. The ribs. 35. The belly. 36. The flanks.—The Hind Part. 37. The rump. 38. The tail. 39. The buttocks. 40. The hames. 41. Theifle. 42. The thighs. 43. The hock. 44. The kerb. 45. The point of the hock. That British horses are held in by foreigners so long ago as the reign of Athelstan, may be collected from a law of that monarch, prohibiting their exportation, except they were designed as presents. These must have been the native kind, or the prohibition would have been needless; for commerce was at that time too limited to receive improvement from any but the German kind, to which country their own breed could be of no value. But when the intercourse with the other parts of Europe was enlarged, they soon laid hold of the advantages this gave of improving the breed. Roger de Beleme, earl of Shrewsbury, is the first that is on record: he introduced the Spanish stallions into his estate in Powisland, from which that part of Wales was for many ages celebrated for a swift and generous race of horses. Giraldus Cambrensis, who lived in the reign of Hen. II. takes notice of it; and Michael Drayton, contemporaneous with Shakespear, sings their excellence in the fifth part of his Polyolbion. This kind was probably destined to mount the gallant nobility, or courageous knights for fears of chivalry, in the generous contests of the tiltyard. From these sprung, to speak the language of the times, the flower of couriers, whose elegant form added

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TECHNICAL DESCRIPTION of the Parts of a Horse. Plate

Equus

Fea of soft woolly hair, and extends quite to the hinder parts of the thighs; the hair at the end of the tail are coarse, and about a span long. The colour of the hair in general is a dark brown, but in the inner part of the face, the sides of the neck and body, are of a flaxen colour; the hind part of the thighs are the same; the fore part divided from the flank by a white line, which extends round the rump to the tail; the belly and legs are also white, along the very top of the back, from the mane quite to the tail, runs a stripe of bushy waved hairs of a coffee-colour, broader above the hind part, growing narrower again towards the tail; another of the same colour crosses it at the shoulders (at the males only), forming a mark, such as distinguishes the same asfs: the dorsal band and the mane are bounded on each side by a beautiful line of white, well described by Oppian, who gives an admirable account of the whole. Its winter coat is very fine, soft, and silky, much undulated, and like that of the camel; its summer coat is very smooth, silky, and even, with exception of certain shaded rays that mark the sides of the neck, pointing downwards.

These animals inhabit the dry and mountainous parts of the deserts of Great Tartary, but not higher than lat. 48. They are migratory, and arrive in vast troops to feed, during the summer, in the tracts east and north of lake Aral. About autumn they collect in herds of hundreds, and even thousands, and direct their course towards the north of India, to enjoy a warm retreat during winter. But Persia is their most usual place of retirement: where they are found in the mountains of Cabbin, some even at all times of the year. If we can depend on Barbaga, they penetrate even into the southern parts of India, to the mountains of Malabar and Golconda. According to Leo Africanus, wild asfs of an all-colour are found in the deserts of northern Africa. The Arabs take them in snares for the sake of their flesh. If fresh killed, it is hot and unappetising: if kept two days after it is boiled, it becomes excellent meat. These people, the Tartars and Romans, agreed in their preference of this to any other food: the latter indeed chose them young; at a period of life in which it was called Lusifia; (vide Martial, xiii. 27.) The epics of Rome preferred those of Africa to all others. The grown onagers were introduced among the spectacles of the theatre; and their combats were preferred even to those of the elephants.

The manners of the wild asfs are very much the same with those of the wild horfe and the dhlukkel. They assemble in troops under the conduct of a leader; and are very fly. They will, however, flop in the midst of their course, and even suffer the approach of man at that instant, but will then dart away with the rapidity of an arrow diffimulated from the bow. This Herodotus speaks to, in his account of those of Mesopotamia; and Leo Africanus, in that of the African.

They are extremely wild. Holy writ is full of allusions to their savage nature. "He crowneth the multitude of the city, neither regardeth he the crying of the driver." (Job xxxix. 7.) Yet they are not untameable. The Periæs catch and break them for the draught; they make pits, half filled with plants to leffen the fall, and take them alive. They break, and hold them in great esteem, and sell them at a high price. The famous breed of asfs in the east is produced from the koulan reclamed from the savage state; which highly improves the breed. The Romans, who kept the breed of asfs produced from the dhlukkel and tame asfs to excel all others. The Tartars, who kill them only for the sake of the flesh and skins, lie in ambush and shoot them. They have been at all times celebrated for their amazing swiftness; for which reason the Hebrews called them Peres as they styled them Aros from their braying. Their food is the faillest plants of the deserts, such as the kals, triplicus, cheno-podium, &c; and also the bitter milky tribe of herbs: they also prefer salt-water to fresh. This is exactly conformable to the history given of this animal in the book of Job; for the words "barren land", expressive of its dwelling, ought, according to the learned Bochart, to be rendered "dull places." The hunters lie in wait for them near the ponds of brackish water, to which they resort to drink: but they are not of a thirsty nature, and seldom have recourse to water.

These animals were anciently found in the Holy land, Syria, the land of Uz or Arabia Deserta, Mesopotamia, Phrygia, and Lydia. But at present they are entirely confined to the countries above mentioned. Chagrin, a word derived from the Tartar fougrh, is made of the skin of these animals, which grows about the rump, and also those of horses, which is equally good. There are great manufactures of it at Africa in and in all Peria. It is a mistake to suppose it to be naturally granulated, for its roughness is entirely the effect of art. The Periæns use the bide of the wild asf as a remedy against the dimness of sight: and the same people, and the Nogayan Tartars, have been known to endeavour the most infamous satisfactions with it, in order to free themselves from the disorders of the kidneys.

The tame or domestic asf is, a humble, patient, and tranquil animal. He submits with firmness to strokes and chastisement; he is temperate both as to the quantity, and quality of his food; he contents himself with the rigid and disagreeable herbage which the wild and other animals leave to him and disdain to eat: he is more delicate with regard to his drink, never using water unless it be perfectly pure. As his matter does not take the trouble of controlling him, he often rolls himself on the turf among thistles, ferns, &c. Without regarding what he is carrying, he lies down to roll, as often as he can, seeming to reproach his master for neglect: and want of attention. When very young, the asf is a gay, sprightly, nimble, and gentle animal. But he soon loses these qualities, probably by the bad usage he meets with; and becomes lazy, untractable, and stubborn. When under the influence of love, he becomes perfectly furious. The affection of the female for her young is strong: Pliny affirses us, that when an experiment was made to discover the strength of maternal affection in a she-asf, she ran through the flames in order to come at her colt. Although the asf be generally ill used, he discovers a great attachment to his master; he smells him at a distance, searces the places and roads he used to frequent, and easily distinguishes him from the rest of mankind. The asf has a very fine eye, an excellent scent, and a good ear. When overloaded, he hangs his head, and links his ears:
If you lay him on his side, he will remain in this situation without making any eye refits on the ground, whatever be the fame thing of the female is clearer and more piercing than that of the male; and covered cries and fenfible to the whip and teeth of the afs fall out and grow at the fame age and in the fame manner nearly the fame marks in his mouth.

months after impregnation; may not be months, that the growth and nourishment of the fems he the largeft and be at leaft in growing, and lives till he he 25 or 30 years old. The females are in feafon during the months of May and June. The milk appears in the duggs ten months after impregnation; the brins forth in the twelfth month, and always one at a time. Seven days after the birth, the feaston of the female returns, and he is again in a condition to receive the male. The colt should be taken from her at the end of five or six months, that the growth and nourishment of the fetus may not be obstructed. The falton or jack-afs should be the largest and strongest that can be found; he should be at leaft three years old, and never ought to exceed ten. The afs, like the horfe, takes three or four years in growing, and lives till he be 25 or 30; he sleeps less than the horfe, and never lies down to sleep but when excessively fatigued. He is more robust, and lea subject to diseases, than the horfe.

Travellers inform us that there are two forts of afss in Peria; one of which is used for burdens, they being flow and heavy; the other is kept like horses for the faddle; for they have smooth hair, carry their head well, and are much quicker in their motion; but when they ride them, they fit nearer their buttoks than when on a horfe: they are dressed like horses, and are taught to amble like them; but they generally cleave their nostrils to give them more room for breathing. Dr Ruffel likewise tells us they have two forts in Syria; one of which is like ours; and the other very large, with remarkable long ears; but they are both put to the same ufe, which is, to carry burdens.

In America there were originally no afss at all, nor yet horses; but they were carried thither long ago, at firft by the Spaniards, and afterwards by other nations, where they multiplied greatly; infomuch, that, in fome places, there are whole droves of them that run wild, and are very hard to be caught. Asfs in general carry the heaviest burdens in proportion to their bulk; and, as their keeping costs little or nothing, it is a great wonder that they are not put to more ufes than they generally are among us. The flesh of the common afs is never eaten in these parts of the world; though fome pretend their colts are tenderer, and not disagreeable.

3. The Hemionus of Pallas, or Wild Mule, is of the size and appearance of the common mule; with a large head, flat forehead growing narrow toward the nose, eyes of a middle fize, the irides of an obscure afh-colour: 38 teeth in all, being two in number fewer than in a common horfe: ears much longer than thofe of a horfe, quite ereft, lined with a thick whitifh curling coat; neck fonder, compressed; mane upright, short, soft, of a greyifh colour; in place of the foretop, a short tuft of downy hair about an inch and three quarters long. The body is rather long, and the back very little elevated; the breast protuberant and sharp. The limbs are long and elegant; the thighs thin, as in a male's. Within the fore-legs there is an oval callus; in the hind legs none. The hoofs are oblong, smooth, and black; the tail is like that of a cow, flender, and for half of its length naked, the rest covered with long afh-coloured hairs. Its winter coat grey at the tips, of a brownifh afh-colour beneath; about two inches long, in sofness like the hair of a camel, and undulated on the back. Its summer coat is much shorter, of a more elegant smoothnes, and in all parts marked more beautifully with small vortexes. The end of the nose is white; from thence to the foretop and inclining to tawny. The buttocks are white; as are the inside of the limbs and belly. From the mane a blackifh reflefeous line extends along the top of the back to the tail, broadfet on the joints, and growing narrower towards the tail. The colour of the upper part of the body is a light yellowifh grey, growing paler towards the fides. The length, from the tip of the nose to the bafe of the tail, is six feet seven inches; length of the trunk of the tail one foot four; of the hairs beyond the end, eight inches. The height of the animal is three feet nine. This species inhabits the deferts between the rivers Onon and Argun in the moft southern part of Siberia, and extends over the vaft plains and deferts of western Tartary, and the celebrated fandy defert of Gobi, which reaches even to India. In Siberia they are feen only in fmal numbers, as it detached from the numerous herds to the fouth of the Russian dominions. In Tartary they are particularly converfant about Taricnoor, a falt lake at times dried up. They flan wooded tracks and lofty snowifh mountains. They live in separate herds, each confifting of a chief, a number of mares and colts, in all to the number of about 20; but seldom fo many, for commonly each male has but five and fometimes fewer females. They copulate towards the middle or end of August; and bring for the moft part but one at a time, which by the third year attains its full growth, form, and colour. The young males are then driven away from their paternal herds, and keep at a diftance till they can find mates of their own age which have quitted their dames. These animals always carry their heads horizontally; but when they take to flight, hold them upright, and ereft their tail. Their neighing is deeper and louder than that of a horfe. They fight by biting and kifking, as usual with the horfe; they are fierce and untameable; and even tho' which have
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have been taken young, are so intractable as not to be broken by any art which the wandering Tartars could use. Yet was it possible to bring them into fit places, and to provide all the conveniencies known in Europe, the task might be effected: but it is doubted whether the subdued animal would retain the swiftness which it is so celebrated for in its state of nature. It exceeds that of the antelope; it is even proverbial; and the inhabitants of Thebet, from the fame of its rapid speed, mount on it Chammo their god of fire. The Mongolians despair of ever taking them by the chase; but lurk behind some tomb, or in some ditch, and shoot them when they come to drink or eat the salt of the desert. They are excessively fearful animals, and provide against danger. A male takes on him the care of the herd, and is always on the watch. If they see a hunter, who by creeping along the ground has got near them, the central takes a great circuit, and goes round and round him, as discovering somewhat to be apprehended. As soon as the animal is satisfied, it rejoins the herd, which sets off with great precipitation. Sometimes its curiosity compels it to follow; for it approaches so near as to give the hunter an opportunity of shooting it. But it is observed, that in rainy or in stormy weather, these animals seem very dull, and less susceptible of the approach of mankind. The Mongolians and Tungusi, according to Do Halden, kill them for the sake of the flesh, which they prefer to that of hares, and even to that of the wild boar, esteeming it equally nourishing and wholesome. The skin is also used for the making of boots. Their fenches of hearing and smell are most exquisite: so that they are approached with the utmost difficulty. The Mongolians call them $dbikstsr$, which signifies "the eared," the Chinese, $yo$ $ts$", or "mule." In ancient times the species extended far to the south. It was the heminones or half as of Aristophane, found in his days in Syria, and which he celebrates for its amazing swiftness and its swiftness, a breeding mule being thought a prodigy; and Pliny, from the report of Theophratus, speaks of this species being found in Cappadocia, but adds that they were a particular kind.

The domestic mules of present times (equus mulus of Gesier and Liimaeus) are the offspring of the horse and the ass, or ass; are very hardy, and have more the form and disposition of the ass than the horse. The finest are bred in Spain; very large ones in Savoy.

4. The Zebra. This animal has the figure and gracefulness of the horse, joined to the swiftness of the flag. He is about seven feet long, from the point of the muzzle to the origin of the tail, and about four feet high. The colour of his skin is beautiful and uniform, consisting of alternate parallel rings of black and white, disposed in the most regular manner, as represented in the plate. He is generally less than the horse and larger than the ass. The zebra is found no where but in the eastern and southern provinces of Africa, from Ethiopia to the Cape of Good Hope, and from the Cape of Good Hope to Congo. The Dutch have been at great pains to tame and use them for domestic purposes, but with little success. He is hard-mouthed, and kicks when any person attempts to touch or come near him. He is refractory and obstinate as a mule; but perhaps the wild hore is naturally as intractable as the zebra; for it is probable, if he were early accustomed to obedience and a domestic life, he would become as docile as the horse.

5. The quacha, or quagga, is striped like the former on the head and body, but with fewer lines. The flanks are spotted; the rump is plain; the ground colour of the head, neck, body, and rump, a bright bay; the belly, thighs, and legs are white, and free from all marks. This species, till of late, has been supposed to be the female of the zebra; but recent observations prove that the male and female zebra are marked alike. This differs likewise in being thicker and stronger made, and in being more tractable; for instance, one had been so far broken as to draw in a cart. The Hottentots also distinguish them from the former, by the names of quagga and opengba.

ERA, in chronology. See ER.

ERANARCHA, a public officer among the ancient Greeks; whose business was to preface over and direct the alms and provisions made for the poor. Cornelius Nepos, in his life of Eupaminonda, describes his office thus: When any person was reduced to poverty, taken captive, or had a daughter to marry, which he could not effect for want of money, &c. the eranarcha called an assembly of friends and neighbours, and taxed each according to his means and estate, to contribute towards his relief.

ERANTHEMUM, in botany: A genus of the monogynia order, belonging to the diandria class of plants; and in the natural method ranking with those of which the order is doubtful. The corolla is quinquefled, with the tube filiform; the antheræ without the tube; the stigma simple.

ERASISTRATUS, a celebrated physician, grandson to the philosopher Aristotle. He discovered by the motion of the pulse the love which Antiochus had conceived for his mother-in-law Stratonice, and was rewarded with 100 talents for the cure by the father of Antiochus. He was a great enemy to bleeding and violent physic.

ERASMUS (Desiderius), born at Rotterdam in 1467. He left his father and mother at 14 years of age; and was committed to the care of certain guardsians, who would force him to be an ecclesiastic, which he refused for a long time. However, he was obliged to assume the religious habit among the canons regular in the monastery of Stein near Tergou; but afterwards obtained a dispensation from his vows. He was the most learned man of the age in which he lived; and contributed, by his example and his writings, to the reformation of learning in the several countries in which he occasionally resided, viz. Italy, Switzerland, Holland, France, and England: with the last he was most satisfied; and found the greatest encouragement from Henry VIII. Sir Thomas More, and all the learned Englishmen of those days. He published a great many books; and died at Basel in 1536. He was buried honourably, and his memory is still held in veneration. He had, however, many enemies; and as he did not embrace the reformation, and yet censured many things in popery, he had been treated injuriously both by Catholics and Protestants. The works of Erasmus in 10 vols. folio were published at Leyden in 1706, in a very handsome manner, under the care
EREASTIANS, a religious sect or faction which arose in England during the time of the civil wars in 1647, thus called from their leader Thomas Eraftus, whose distinguishing doctrine it was, that the church had no right to discipline, that is, no regular power to excommunicate, exclude, censure, absolve, decree, or the like.

EREATOSTHENES, a Cyrenian philosopher, historian, and poet; called for his learning Plato Minor. He was keeper of the famous library at Alexandrea; and was greatly in favour with Polycy Energetes, by whose order he wrote a history of the Thelam kings of Egypt, which succeffion was entirely omitted by Manetho. He thus fixed the Egyptian chronological, and his authority is by many preferred to that of Manetho. He wrote many other things, a catalogue of which is to be seen in Fabricius, Volius, &c. but his only piece now remaining entire is a description and fabulous account of the stars. Hestarved himself in old age through grief for the dimmell of his light, about the 10th or 11th year of Polylene Ephiphanes, 194 B. C.

ERATO, (from śre ᾿I lore), in mythology, the name of one of the nine muses which preceded over love-poetry. To this muse some have ascribed the invention of the lyre and lute; and she is represented with a garland of myrtles and roses, holding a lyre in one hand and a bow in the other, and at her side a Cupid with his torch. There is also a Nereid of the same name.

ERATOHESTHES, a Cyrenian philosopher, historian, and poet; called for his learning Plato Minor. He was keeper of the famous library at Alexandria; and was greatly in favor with Polycrates Energetes, by whose order he wrote a history of the Thelam kings of Egypt, which succession was entirely omitted by Manetho. He thus fixed the Egyptian chronological, and his authority is by many preferred to that of Manetho. He wrote many other things, a catalogue of which is to be seen in Fabricius, Volius, &c. but his only piece now remaining entire is a description and fabulous account of the stars. He starved himself in old age through grief for the dimness of his light, about the 10th or 11th year of Polylene Ephiphanes, 194 B.C.

ERATOSTRATUS, an Epeian who burnt the famous temple of Diana the same night that Alexander the Great was burnt. This burning, as some writers have observed, was not prevented or seen by the gods of the place who were then present at the labours of Olympia, and at the birth of the conqueror of Persia. Eratostatus did this villainy merely to eternize his name by so uncommon an action.

EREBUS, ẹpìstr, from ῾I eπ Alejandro, in mythology, a term denoting darkness. According to Heciod, Erebos was the son of Chaos and the nght, and the father of the day. This was also the name of part of the inferi or among the ancients: they had a peculiar ex piation for those who were detained in Erebos. Erebos was properly the gloomy region, and distinguished both from Tartaros the place of torment, and Elysium the region of bliss: according to the account given of it by Virgil, it forms the third grand division of the invisible world beyond the Styx, and comprehends several particular districts, as the limbus infans, or receptacle for infants; the limbus for those who have been put to death without cause; that for those who have destroyed themselves; the fields of mourning, full of dark groves and woods, inhabited by those who died for love; and beyond these, an open champaign country for departed warriors.

ERECTION, in a general sense, the art of raising or elevating any thing; as the erection of a perpendicular, &c. It is also used in a figurative sense: as the erection of a bithropic, marquise, &c.

ERECTION is particularly used by medical writers for the state of the penis when swelled and diffused by the action of the muscles called erecIores. See Anatomy, p. 739.

There is also an erection of the elitoris which is performed by muscles for that purpose.

EREMIT. See HERMIT.

ERETRIA (anc. geog.), a town of Euboea, situated on the Euripus, in the south-west of the island. A very ancient city, and the largest of the island, after Chalcis. After being demolished by the Persians, it was restored on an adjoining spot, according to Strabo, who mentions a school of Eretrian philosophers there. The Abantes of Homer were of Euboea.

ERFORT, a town of Germany, in the circle of Upper Saxony, the capital of Thuringia, and subject to the elector of Meins. It is defended by good ramparts; and has a castle on an eminence which commands the town. Its inhabitants are almost all Lutherans, but its principal churches belong to the Catholics. There are several handsome structures, both public and private; and the houses in general are but indifferently built. E. Long. 11. 14. N. Lat. 50. 49.

ERGASTULUM, among the Romans, was a pri son, work-house, or house of correction, where slaves by the private authority of their masters were confined and kept for their offences to hard labour. The Greeks had a place of confinement of this sort called ἵππος περίκεντρον.

ERGOT, in farriery, is a tub, like a piece of soft horn, about the bigness of a cheatful placed behind and below the pattern-joint, and commonly hid under the tuft of the fetlock.

ERICA, ἐρήπι, in botany: A genus of the monogynia order, belonging to the Oenandra class of plants; and in the natural method ranking under the 15th order, Bicornes. The calyx is tetracyphalous; the corolla quadrifid; the filaments inserted into the receptacle; the anthera bifid; the capsule quadrilocular. Of this there are four species, natives of Britain; which are so well known, that no description needs be given of them. In the Highlands of Scotland this plant is made subjervient to a great variety of purposes. The poorer inhabitants make walls for their cottages with alternate layers of heath and a kind of mortar made of black earth and straw. The woody roots of the heath are placed in the centre; the tops externally and internally. They make their beds of it, by placing the roots downwards; and the tops only being uppermost, they are sufficiently soft to sleep upon. Coblings are also thatched with it. In the island of Ilay, ale is frequently made by brewing one part of malt and two of the tops of young heath; sometimes adding hops. Boethius relates that this liquor was much used by the Picts. Woollen cloth boiled in alum water, and afterwards in a strong decoction of heath-tops, comes out of a fine orange color. The stalks and tops will tan leather. Bees extract a great deal of honey from the
ERIDANUS [709]

ERIDANUS, the flowers; and, where heat abounds, the honey has a reddish call. There are many exotic species with which greenhouse collections are enriched and adorned, as the trifolus, umbilica, aurantia, &c.

ERIDANUS (anc. geogr.) a river of Attica, falling into the Gulf of Spercheius. Another Eridanus, the more ancient name of the Padus, an appellation ascribed by Pliny to the Greeks; followed in this by Virgil. It rises in Mount Velinus, in the Alps Cottae, and dividing the Cisalpine Gaul into the Cispadana and Transpadana, and swelled on each hand with no incon siderable rivers from the other Alps and the Appennine, falls at seven mouths into the Adriatic. Famous in mythology, from the story of Phaeton; whose sisters, the Heliades, were here changed into poplars, according to Ovid.

ERIDANUS, in astronomy, a constellation of the southern hemisphere, in form of a river. The stars in the constellation Eridanus, in Ptolemy’s catalogue, are 24; in Tycho’s, 19; and in the British Catalogue, 84.

ERIE, a vast lake to the westward of Pennsylvania, in North America, situated between 80° and 87° W. Long.; and between 41° and 42° N. Lat.

ERIGENA, or Scotus, (John,) a famous scholastic divine, born about the beginning of the ninth century; but where, is a matter of dispute among authors. Bale and Pits say he was born at St David’s in Wales; Dempster, Mackenzie, and Henry, that he was born at ayr in Scotland; which they infer from his name Erige and Scotus, by the latter of which he was generally distinguished by his contemporaries. But Du Pin and Sir James Ware assert that he was by birth an Irishman; Ireland being in those days called Scotia, and by the natives Eries. They agree, however, in relating that he travelled to Athens, where he acquired a competent knowledge of the Greek and other oriental languages; and that he afterwards resided many years in the court of Charles the Bald, king of France, who, on account of his singular abilities, treated him as his intimate friend and companion. He slept frequently in the royal apartment; and was constantly admitted to the king’s table. “We may judge,” says a modern historian, “of the freedom which he used with Charles, by the following repartee. As the king and Scotus were sitting one day, at table, opposite to each other, after dinner, drinking a cheerful glass, the philosopher having said something that was not quite agreeable to the rules of French politeness, the king in a merry humour asked him, ‘Pray what is between a Scot and a Scot ?’ To which he answered, ‘Nothing but the table.’” See Henry’s History of Great Britain, vol. I. p. 544, who quotes this story from Hoveden Annual, ad an. 86. Quer. What language were they talking when this bon mot was uttered?

During his residence with Charles, he wrote several books of scholastic divinity; which, though absurd enough, were at that time not sufficiently so to secure him from the imputation of heterodoxy; and on that account the pope commanded Charles the Bald to send him to Rome; but the king had too great a regard for his companion to trust him with his holiness. One of the chief controversies in which Scotus was engaged, and with which the pope was much offended, was concerning the real presence and blood of Christ in the wafer. His opinion of this weighty matter is expressed in these few words: “What we receive corporally is not the body of our Lord; but that which feeds the soul and is only perceived by faith.” He was also engaged in two other controversies of equal importance, but of a somewhat less delicate nature. The first was, Whether any part of the eucharist be evacuated by soil? and the second, Whether Christ was born of the Virgin Mary aperta vulva? Pachatus was of opinion, that this could not be without some injury to her perpetual virginity; and therefore believed that Christ came into the world per vulvas clausfas, as he came into the place where his disciples were assembled, through the door and not through the wall, without opening the door. Concerning the first of these delicate questions, Scotus with several others declared, that part of the eucharist was certainly evacuated by soil; for which they were honoured with the appellation of Stercorarii. And as to the second question, he said, that the vulva clausa was a dangerous opinion; for it would thence follow, that he was not born, but ifixed or non est uti eae fede corrupti. See Mackenzie, vol. I. p. 55.

Whether this John Scotus returned to England, or ended his days in France, is a matter of doubt. Some historians tell us, that he left France in the year 864; and that, after residing about three years in Oxford, he retired to the abbey of Malmsbury, where his scholars flabb’d him with their penknives. There is no foundation for this story. Probably he died about the year 874; but whether in France or England, is uncertain, and of little importance. Some have related, that he was invited to England by king Alfred: but in this they confound him with John, abbot of Etchelung, who was assassinated in 895; and to this mistake the various accounts concerning this author are to be attributed. Regardless of his history, he appears from his writings to have been a man of parts, and, in point of learning, superior to any of his contemporaries. He wrote, 1. De divisione nature, lib. v. 2. De praedestinatione Dei. 3. Excerpta de differentia & facultatibus Graecum Latinae verbi. 4. De corpore et sustentatione Domini. 5. Ambigua S. Maximij seu Scholilia eius in difficiles loca Sacri. 6. Excerpta de Differentia Humana. 7. Opera S. Diumii quattuor in Letaminium et converfa. All published. 7. De sive fine Dies, and several other works, in manuscript, preserved in different libraries.

ERIGERON, FLEA-BANE, in botany: a genus of the polygama superflua order, belonging to the fynogenesis class of plants; and in the natural method raking under the 42nd order Composite. The receptacle is naked; the pappus hairy; the flores of the radius are linear, and very narrow. There are five species; of which the most remarkable is the viseoform, or male flea-bane of Theophrastus, and greater flea-bane of Dioscorides. It is a native of the south of France and Italy; and hath a perennial root, from whence arise many upright stalks near three feet high. The leaves in warm weather sweat out a clammy juice; the flowers are produced single upon pretty long footstalks, are of a yellow colour, and have an agreeable odour. The plants are easily propagated by seeds; and thrive best in a dry soil and sunny exposure.

ERIGONE, in fabulous history, daughter to Icarius,
ERIUS, died of grief for her father's death, was translated into heaven, and made the sign Virgo.

ERINACEUS, or HEDGEHOG, in zoology: a genus of quadrupeds belonging to the order of feræ, the characters of which are these: They have two fore-teeth in the upper jaw, at a considerable distance from one another, and two in the under jaw, less distant; and they have two reumbent dog-teeth, one on each side. The hedge-hog has a very uncommon method of defending himself from the attacks of other animals: being possested of little strength or agility, he does not attempt to fly from or afford his enemies; but erects his bristles, and rolls himself up like a ball, exposing no part of his body that is not furnished with sharp weapons of defence; he will not unfold himself, unless thrown into water; the more he is frightened or harassed, the clofer he shuts himfelf up, and frequently detaches his urine, which has a very fetid and lothsome smell. While in this state, molt dogs, instead of biting him, stand off and bark, not daring to feize him; or, if they attempt it once, their mouths are fo prickled with his bristles, that they cannot be previ­ ced upon to attempt it a second time. Both the male and female are covered with bristles from the head to the tail. These bristles are of great use in defending them from other animals; but must be very inconvenient when they incline to copulate. This operation they cannot perform in the manner of other quadrupeds; but do it face to face, either standing on end, or the female lying on her back. The females come in feafon in the spring, and bring forth their young in the beginning of summer. They commonly bring forth three or four, or sometimes five at a time. The young ones are of a whitifh colour, and only the points of the bristles appear above the skin. It is impossible to tame them: the mother and her young have frequently been confined together, and furnished with plenty of provifions; but, instead of nourifhing them, they uniformly devoured them one after another. Males and females have likewise been kept in one apartment, where they lived, but never copulated. Hedge-hogs feed upon fallen fruits, fome roots, and insects: they are very fond of flesh-meat, whether raw or roasted. They frequent woods, and live under the trunks of old trees, in the chinks of rocks, or under largestones. Naturalists allege, that they go into gardens, mount the trees, and come down with pears, apples, or plums, fluck upon their bristles. But this is a mistake: although kept in a garden, they never attempt to climb trees, or flick even fallen fruit upon their bristles, but lay hold of their food with their mouth. They never come out of their holes in the day, but go about in quest of food during the night. They eat but little, and can live very long without taking any nourishment. They do not lay up any store of provifions in harvest. Such an instance would be useless, as they sleep all the winter. They lie under the underrayed prooip of flocking cattle and hurting their udders; but the smallest effes of their mouths renders that impossible. There are three species, viz.

1. The europæus, or common hedgehog, with round ears, and crefted nostrils. It is about nine inches long; the upper part of the body is totally covered with fharp priclikes, and the under part is covered with hair. The hedgehog, even when standing on his legs, has a very ugly aspect. His body is an oblong mass, convex above, terminated on the fore-part by a very sharp muzzle, and mounted on four short legs, of which nothing appears but the feet, and the tail is not discernible. His ears are broad, round, and short; and his eyes are small and protuberant. The length of his body, from the point of the muzzle to the anus is about nine inches. - 2. The linuris, or white hedge-hog, has no external ears. It is a native of America. 3. The malaccensis has hanging ears, and is a native of Asia.

ERINGO, in botany. See ERINGIUM.

ERINUS, in botany: A genus of the angiofpermia order, belonging to the didynamae class of plants; and in the natural method ranking under the 40th order, Peronotae. The calyx is pentaphyllous; the limb of the corolla quinquefæd and equal; with its lobes mar­ ginated, and the upper lip very short and reflexed; the capsule bilocular. There are fix species, none of them natives of Britain. They grow from two inches to four feet in height, and are adorned with flowers of a white or purple colour. They are propagated by seeds, but in this country generally require to be kept in a flore.

ERIOCAULON, in botany: A genus of the tri­ gynia order, belonging to the triandria class of plants; and in the natural method ranking with the sixth order, Enfate. The common calyx is an imbricat capi­ luum or knob; there are three equal petals; and the fla­ mina are on the germén.

ERIOCEFALUS, in botany: A genus of the polygamina necessitaria order, belonging to the fyngefia class of plants; and in the natural method ranking under the third order, Calamaris. The glumes are paleaceous and imbricat all round; there is no corolla; and only one seed furnished with a very long down.

ERITHALIS, in botany: A genus of the monogyna order, belonging to the triandria class of plants; and in the natural method ranking under the third order, Calamaris. The corolla is quinquefæd; the calyx is deccephylus and equal; the radius has five flores.

ERIOPHORUM, in botany: A genus of the monogyna order, belonging to the triandria class of plants; and in the natural method ranking with the third order, Calamaris. The calyx is deccephylus and equal; the radius has five flores.

ERIVAN, a city of Persia, in Asia, and capital of Persian Armenia. It is a large, dirty, ill-looking place, in which are no handsome buildings, the houfes being very mean, and railed with earth or mud; but it is full of gardens or vineyards. It is situated in a plain which is surrounded on all sides with mountains. Two rivers pass near it, the Zengi to the north-west, and the Queen Bulac to the south-west. The forretts may pass for a town of itself; it is of an oval form, and is four miles in circumference, containing about 800 houfes. It is inhabited by none but the native Persians. The Armenians have shops in it, where they work and trade in the day-time, but at night return to their habitation in the city. The fortresses are surrounded with three walls, made with bricks dried in the sun, which have battlements, and are flanked with towers,
ERMES, in heraldry, the reverse of ermine, i. e., white spots on a black field.

ERMINITES, in heraldry, should signify little ermines, but it is otherwise; for it signifies a yellow field powdered with black, only that every such spot hath a little red hair on each.—Erminettes also signify a yellow field powdered with black, which the French express much better by or, feme d'ermines de faible.

ERMINOIS, in heraldry, signifies the field or, and the spots black.

EROORO, in ornithology. See Acrocephalus, of which it is a species.

EROS (of ερως "love"), in mythology, one of two chiefs over all the other Cupids, being the cause of love. See Anteros.

EROTIA, a festival in honour of Eros the god of love. It was celebrated by the Thebians every fifth year with sports and games, when musicians and others contended. If any quarrels or seditions had arisen among the people, it was usual to offer sacrifices and prayers to the god, that he would totally remove them.

EROTIC (derived from ερως "love," whence ερωτικός), is applied to any thing which has a relation to the passion of love.

In medicine we find the phrase delirium eroticum used for a kind of melancholy contracted through excess of love.

EROSION, among physicians, denotes much the same with corrosion, only in a stronger degree.

EROTESIS. See Oratory, n° 96.

EPÆNIUS (Thomas), in Dutch Thomas of Eper; a celebrated professor of the Arabic language, was born at Gorcum in Holland, in 1584, and educated at Leyden. He applied himself to the oriental languages at the persuasion of Joseph Scaliger; and afterwards travelled into England, France, Italy, and Germany, and every where obtained the esteem of the learned. On his return to Holland, he was made professor of Arabic in the university of Leyden, and died there in 1624. He published a great many excellent works, which spread his reputation through the whole learned world. It is said, that the king of Morocco admired so greatly the letters Erpinus wrote to him in Arabic in the name of the United Provinces, that he could not cease reading them, and showing them to those who spoke that language naturally.

ERUBESCENT, in general, something that wanders, or is not regular; hence it is the planets are called erraticae farrae.

ERRHINES, in pharmacy, medicines which when snuffed up the nose promote a discharge of mucus from that part.

Among the milder kinds of the errhines we may reckon majorum, basilicon, thyme, hyssop, favory, marum syriacum, the tops of origanum, flowers of lilies of the valley, and gum benzoin, the resin of gualicum, fine raspings of aloes wood, dry volatile falt of ammonic perfumed with oil of majorum, as also white vitriol. On the contrary, violent errhines are, euphorbium, the powder of white hellebore, and, in a milder degree, several sorts of snuffs, precipitate mercury, and pepper.

Errhines are more friendly to the constitution and nerves.
nerves than from various, by their subtle, acrid, and volatile feel gently stimulating the pituitary membrane, and drawing the mucous humour from it. They are also much fierer than from various in their effects.

Errhines prepared of cephalic herbs are of singular service in oppressive pains of the head, a hemiconia, lethargic disorders, weaknesses of memory, flushings of the head, and corryza, irreligious delusions of the eyes, drowns, vertigoes, and in cases where the malignants humours generated by the lues venera are lodged in the membranes of the nostrils.

ERROR, in philosophy, a mistake of our judgment, giving ascent to that which is not true.

Mr Locke reduces the causes of error to these four; first, want of proofs; secondly, want of ability to use them; thirdly, want of will to use them; and, fourthly, wrong measures of probability.

He observes upon the first of these causes of error, that the greatest part of mankind want conveniences and opportunities of making experiments and observations themselves, or of collecting the testimony of others, being prevented by the necessity of their condition. Upon the second of these causes, he observes, that there are many, who, from the state of their condition, might bestow time in collecting proofs, but yet are not able to carry a train of consequences in their heads, nor weigh exactly the preponderancy of contrary proofs and testimonies, merely from the difference in men’s understandings, apprehensions, and reasons. Thirdly, he remarks, that though some have opportunities and leisure enough, and want neither measures of probability, he imputes, 1. To the practice of taking for principles propositions that are not in themselves certain and evident, but on the contrary, doubtful and false. 2. To received hypotheses. 3. To predominant passions or inclinations. And, 4. To authority, or giving up our assent to the common received opinions either of our friends or party, neighbours or country.

The causes of error in philosophy, or the reasons why all former philosophers have through so many ages erred, according to Lord Bacon, are these following, 1. Want of time fitted to learning. 2. The little labour bestowed upon natural philosophy. 3. Few entirely addicted to natural philosophy. 4. The end of the sciences wrong fixed. 5. A wrong way chosen. 6. The neglect of experiments. 7. Regard to antiquity and authority. 8. Admiration of the works in use. 9. The artifice of teachers and writers in the sciences. 10. Opinions promiscuous of the moderns. 11. Want of propounding worthy tasks. 12. Superfition and zeal being opposite to natural philosophy, as thinking philosophy dangerous, on account of the school-theology; from the opinion that deep natural inquiries should subvert religion. 13. Schools and academies proving unfavourable to philosophy. 14. Want of rewards. And, 15. Despair, and the supposition of impossibility.

ERROR Loci. Boerhaave is said to have introduced the term, from the opinions that the vessels were of different sizes for the circulation of blood, serum, and lymph; and that when the larger-fixed globules were forced into the lesser vessels by an error of place, they were obstructed. But this opinion does not seem well grounded.

ERUCA, in general, denotes caterpillars of all kinds.

The caterpillar state is that through which every butterfly must pass before it arrives at its perfection and beauty; and, in the same manner, all the known winged animals, except only the puceron, pass through a reptile state; none of them, except this, being produced in their winged form. The change from caterpillar to butterfly was long esteemed a sort of metamorphosis; a real change of one animal into another; but this is by no means the case. The egg of a butterfly produces a butterfly, with all the lineaments of its parent; only these are not disclosed at first, but for the greater part of the animal’s life they are covered with a fort of cafe or mucous coat, in which are legs for walking, which only exist in this state; but its mouth takes in nourishment, which is conveyed to the included animal; and after a proper time this covering is thrown off, and the butterfly, which all the while might be discovered in it by an accurate observer with the help of a microscope, appears in its proper form. Before it pales into this state, however, there requires a state of rest for the wings to harden, and the several other parts to acquire their proper firmness; this is manifested in a time of perfect rest, when the animal lies in what is called the nympha or chrysalis state, in appearance only a lump of inanimate matter. There is a settled and determined time for each of these changes, in every species; but, in the several different kinds the periods are very different.

There is no sign of sex in the animal while in the caterpillar state: the propagation of the species is the business of the creature in its ultimate perfection; and till that, these parts are never excluded: one female butterfly, when she has been impregnated by the male, will produce 300 or 400 eggs, or even more.

There is no way of knowing the sexes of these little creatures by viewing the parts; but the whole figure and manner of the animal makes the difference. The females are always larger than the males; they are also more slow in their motions; and some of them have no wings, or, at the most, only very small ones. The males, however, have a sort of beards more beautiful than the antennce or horns of the females; the female is much stronger as well as bigger than the male; and not unfrequently, in case of danger or disturbance, the flies away with him in time of copulation.

On dissecting the female, her uterus affords an afflicting sight. The number of eggs in the tubes is amazing; but these have not all the same figure; and, in some species, as the silk-worm, &c. the eggs are of a beautiful blue; if any yellowish ones are seen among them, they are judged to be defective.

The care of all the butterfly tribe: to lodge their eggs in safety is surprising. Those whole eggs are to be hatched in a few weeks, and who are to live in the caterpillar state during part of the remaining summer, always lay them on the leaves of such plants as will afford a proper nourishment; but, on the contrary, those whole eggs are to remain unhatched till the following spring, always lay them on the branches of trees
trees and shrubs, and usually are careful to select such places as are least exposed to the rigour of the ensuing season, and frequently cover them from it in an artistic manner. Some make a general coat of a hairy matter over them, taking the hairs from their own bodies for that purpose, others hide themselves in hollow places in trees, and in other sheltered cells, and there live in a kind of torpid state during the whole winter, that they may deposit their eggs in the succeeding spring, at a time when there will be no severities of weather for them to combat. The day-butterflies only do this, and of these but a very few species; but the night ones, or phaenees, all without exception, lay their eggs as soon as they have been in copulation with the male, and die immediately afterwards.

It is well known, that the common and natural food of these creatures is the leaves and verdure of vegetables; yet, as weak and harmless as they seem, they will many of them destroy their fellows whenever they get an opportunity. M. Reaumur gives us an instance of this in 20 caterpillars of the oak, which he kept in a box with a sufficient quantity of their natural food; yet their numbers daily decreased, till at last there remained only one. This is, however, only the case in some few species, the generality of these animals being very peaceable, many species living together in the same place without molesting one another. These species, however, though freed from such dangers, are exposed to others of a much more terrible kind; the worms or maggots of several sorts of flies are frequently found among them, some preying upon their outside, others lodging within them under the skin, but both kinds eating the poor defenceless creature up alive. Those which feed on the outsides are easily discovered, the others are more hid; and frequently the caterpillar, which seems very hearty and vigorous, and very feely, shall be found, upon opening, to be a mere skin, the internal parts being found to be all eaten away, and all the food that he swallows serving only to feed a vast number of worms, or maggots, which crawl about at liberty within him. These devouring worms are of many different species; some being of the gregarious, some of the solitary kinds, and some spinning webs of their own silk to transform themselves in; others undergoing that change without any such covering. The beautiful cabbage-caterpillar is one of those unhappy kinds which frequently are infected with the gregarious kinds, large numbers of which spin themselves webs one after another, and afterwards come out in the shape of the parent fly to whose eggs they owed their origin.

These injurious enemies are a sure prevention of the butterfly's appearing at its proper time; and as many of the former naturalists, who know what butterfly to expect from a peculiar species of caterpillar which they preferred, often laid a parcel of flies come out in the place of it, they having no idea that the fly had laid its eggs in the flesh of the poor creature, duped that this was one of its natural transformations, and that certain species of caterpillars sometimes produced butterflies, sometimes small flies.

These, and many other destroyers, among which the birds are to be reckoned in the principal place, serve a noble purpose in preventing the too great number of these mischievous animals. Their usual habituation being the leaves and flowers of plants, they are, in their feeding, much exposed to all these destroyers: yet nature has taken care to preserve a great number, by making many of them so exactly of the colour of the leaves they feed on, that they are not easily distinguished from them; and by giving others a caution of keeping on the under part of the leaves; and being by that means out of sight. But some species are much less exposed, and of much more mischief to the plants they feed on, by devouring more essential parts of them. Of these some eat the roots and others the interior part of the trunk, destroying the vessels that imbibe, and those that distribute the juices. These are different from the common caterpillars; in that their skin is much less rough and hard; and these are secure from our observation, and in general from their great destroyers the birds. They are not, however, absolutely free from the common dangers of the other species; for there is a kind of worms that find their food and habitation even in the bodies of these.

The root-caterpillars, and those which live within the branches of plants, are much more easily found out. The roots of scrophularia, and the stalks of lettuce, and some other plants, afford caterpillars which seem all of the same species. Those found in the leutes are extremely plentiful some years, and destroy vast quantities of that plant. These usually have their first habitation in the stalk, near the root.

Nothing more surprises us, in regard to insects, than their industry; and in this the caterpillars yield to no kind, not to mention their silk, the spinning of which is one great proof of it. The sheaths and cases which some of these insects build for the passing their transformations under, are, by some, made of the silk, with their own hair, mixed with pieces of bark, leaves, and other parts of trees, with paper, and other materials; and the structure of these is well worthy our attention.

There are others whose workmanship, in this article, far exceeds these. There is one which builds in wood, and is able to give its case a hardness greater than that of the wood itself in its natural state. This is the strange horned caterpillar of the willow, which is one of those that eat their exuviae. This creature has extremely sharp teeth, and with these it cuts the wood into a number of small fragments: these fragments it afterwards unites together into a case, of what shape it pleases, by means of a peculiar silk; which is no other than a rough and vicious juice, which hardens as it dries, and is a strong and firm cement. The solidity of the case being thus provided for, we are to consider, that the caterpillar inclosed in it is to become a butterfly; and the wonder is, in what manner a creature of this helpless kind, which has neither legs to dig nor teeth to gnaw with, is to make its way out of its firm and strong a lodgement as this is in which it is hatched. It has been supposed by some, that the butterfly, as soon as hatched, discharged a liquor which softened the vicious matter that holds the case together, and so its several fragments falling to pieces, the way out lies open. This is evidently the truth of the case; though those who supposed it, did it by mere conjecture: for, on a strict examination, this liquor is always to be found in the animal, and is of the most proper kind for such a service. Reaumur judged, from the effects, that this li-
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quor must be of a singular nature, and very different from the generality of animal fluids: and in digesting this creature in the caterpillar state, there will always be found near the mouth, and under the cælaphagus, a bladder of the bigness of a small pea, full of a limpid liquor, of a very quick and penetrating smell, and which, upon divers trials, proves to be a very powerful acid; and among other properties, which it has in common with other acids, sensibly softens the glue of the caterpillar on a common application.

It is evident that this liquor, besides its use to the caterpillar, remains with it in the chrysalis state, and is the very thing that gives it a power of dissolving the structure of the leaves, and making its way through in a proper manner at the necessary time. Dr. Boerhaave has adopted the opinion, that there are no true acids in animals, except in the stomach or intestines; but this familiar instance proves the error of that determination.

Phil. Trans. ab. n. p. 39, &c.

Another very curious and mysterious artifice, is that by which some species of caterpillars, when the time of their changing into the chrysalis state is coming on, make themselves lodgements in the leaves of the trees, by rolling them up in such a manner as to make themselves a sort of hollow cylindrical cafe, proportioned to the thickness of their body, well defended against the injuries of the air, and carefully secured for their state of tranquillity.

Besides these caterpillars, which in this manner roll up the leaves of plants, there are other species which only bend them once; and others which, by means of thin threads, connect many leaves together to make them a cafe. All this is a very surprising work, but all much inferior to this method of rolling.

The different species of caterpillars have different inclinations, not only in their spinning and their choice of food, but even in their manners and behaviour one to another. Some never part company from the time of their being hatched to their last change; but live and feed together, and undergo together their last change into the chrysalis state. Others separate one from another as soon as able to crawl about, and each hunts its fortune single; and there are others which regularly live to a certain time of their lives in community, and then separate each to shift for itself, and never to meet again in that state. Reaumur, Hist. Infest. vol. ii. p. 267.

Caterpillars are very destructive and pernicious in gardens, particularly those of two species. The one of these is that which afterwards becomes the common white butterfly. This is of a yellowish colour, spotted with black; and infests the leaves of cabbages, cauliflowers, and the Indian cress, of which it eats off all the tender parts, leaving only the fibres entire; so that whole plantations are often destroyed by them in autumn, especially such as are near large buildings, or are crowded with trees. There is no remedy against this evil but the pulling the creatures off before they are spread from their nests, and watching the butterflies, which are daily, in the hot weather, depositing their eggs on these plants. These, however, feed principally on the outside of the leaves of the plants, and are therefore the easier taken off; but the other kind lies near the centre, and therefore is with much more difficulty discovered. This is much larger; and the skin is very tough, and of a brown colour. It is called by the gardeners a grub, and is extremely pernicious. The eggs which produce it are usually deposited in the very heart or centre of the plant, particularly in cabbages; and the creature, when formed, and grown to some size, eats its way through all the blades, and leaves its dung in great quantity behind it, which spoils the cabbage. This insect also burrows under the surface of the ground, and makes sad havoc among young plants, by eating off their tender shoots, and drawing them into its holes. This mischief is chiefly done in the night; but wherever a plant is seen thus destroyed, if the earth be stirred with a finger an inch deep, the creature will be certainly found, and this is the only way of destroying them, Miller.

When these animals attack fruit-trees, the best method of driving them off is to boil together a quantity of rue, wormwood, and the common tobacco, of each equal parts; in common water; to make the liquor very strong, and sprinkle it on the leaves and young branches every night and morning, during the time when the fruit is ripening. See also the article Caterpillar.

In Dr. Hawkeworth's Account of the Voyages to the South Seas, vol. iii. p. 520, we have the following account of a kind of small green caterpillar, which the voyagers found in great numbers on the true West Indian mangroves. Their bodies were thick set with hairs, and they were ranging on the leaves hide by hide like files of soldiers, to the number of 20 or 30 together. When they touched them, they found that the hairs on their bodies had the quality of a needle, and gave them a much more acute though less durable pain.

ERUC. Aquaceae, Water Caterpillars. It may seem incredible, that there is any such thing as a caterpillar whose habitat is under water; but experience and observation prove, that there are such, and that they feed on the water plants as regularly as the common kinds do on those at land. These are not named among the aquatic animals of the larger kinds, as the sea-wolf, the sea-horse, etc. which might as well be called any thing else as nodices and horbes; but they are properly what they are called, and do not respire in the manner of the fish-tribe, but by their stigmata as other caterpillars. M. Reaumur, in his observations, met with two species of these; the one upon the potamogiton or pond-weed, the other upon the lenticula or duck-meat. These are both very industrious animals; but with a spirit being much the largest, its operations are more easily distinguished.

This, though truly an aquatic animal, swims but badly, and does not at all love to wet itself. The parent butterfly lays her egg on the leaf of a certain plant; and as soon as the young caterpillar is hatched, it gnaws out a piece of the leaf, of a roundish shape. This it carries to another part of the same leaf, and lays it in such a manner, that there may be a hollow between, in which it may lodge. It then falls down this piece to the larger leaf with fill of its own spinning; only leaving certain holes at which it can put out its head, and get to gnaw any of the leaves that are near. It easily gets out, though the aperture be naturally...
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Which fill serves as frequent cafe in the branches. They are small, of a pale purple colour, and are succeeded by flat pods, containing two or three seeds which are flat, round, and a little convex in the middle. The seeds of this plant are most commonly own in the month of March, where the land is dry; but in moist ground, the beet time is in April. The usual quantity of feed allowed for an acre of land is from one bushel and a half to two bushels. If these are grown in drills in the same manner as peas, they will succeed better than when grown in broadcast; the drills should be a foot and a half aubender, to allow room for the Dutch hoe to clean the ground between them; for if the weeds are permitted to grow among them, they will get above the lentils and ravage them.

There is another fort of lentil also cultivated in this country under the name of French lentil. It is twice the size of the former, both in plant and feed; and is much better worth cultivation than the other. It should be sown in March, after a single ploughing, in the ground that bore corn the year before. Manure is not absolutely necessary, though it will undoubtedly increase...
ERYTHRAE, or ERYTHRA, an island adjoining, according to the ancients, either to or a part of Gades; no where now to be found by the description given of it by ancient authors. The poets feign this to be the habitation of the fabulous Ceryon, disarmed by Hercules, who drove away his cattle.

ERYTHRAE (anc. geog.), a port town of Etolia, on the Corinthian bay. Another Erythrae of Boeotia, near Platea and mount Cithaeron. A third Erythrae, a town of Ionia in the Hither Asia, situated in the peninsula, at its extremity, with a cognominal port. The Erythraeans laid claim to the Sibyl Herophile, as their country-woman, surmised thence Erythraea. Erythrae was famous for an ancient temple of Hercules. ERYTHREA, a town of Crete, situated in the south-east of the island, at the promontory Erythraeum. ERYTHREUM MARE, erroneously called Rubrum by the Romans. Thus the ocean that washes Arabia and Persia and extends a great way farther, is denominated. Hence it is, Herodotus says, that the Euphrates and Tigris fall into the Mare Erythreum. He also calls it the South Sea, on which the Persians dwell. It takes its name, nor from its colour, the error of the Romans who translated Erythraea, "Rubrum;" but from Erythrae, son of Perseus and Andromeda, whose kingdom lay on the confines of that sea; whence its name Erythraea.

ERYTHRINA, or ERYTHRINA, a genus of the decandria order, belonging to the diadelphus class of plants; and in the natural method ranking under the 34th order, Papilionaceae. The calyx is bilabiate, the one lip above, the other below; the vexillum of the corolla is very long and lanceolated. There are four species, all of them shrubby flowering exotics for the stove, adorned chiefly with trifoliate or three-lobed leaves, and scarlet spikes of papilionaceous flowers. They are all natives of the warm parts of Africa and America; and must always be kept in pots, which are to remain constantly in closes in Britain. They are propagated by seeds, which are annually exported thither from Africa and America. They are to be sown half an inch deep in pots of light rich earth, which are then to be plunged in the bark-bed of the stove; and when the plants are two inches high, they are to be separated into small pots, plunging them also in the bark-bed, giving them frequent waterings, and as they increase in growth shifting them into larger pots. The inhabitants of Malabar make sheath of the wood, for fowords and knives. They use the fame, together with the bark, in wafting a sort of garments which they call sarafes; and make of the flowers the confection caryl. The leaves pulverized and boiled with the mature cocus-nut, confume venereal bubes, and esso pains in the bones; bruised and applied to the temples, they cure the cephalae and ulcers; mixed with the sugar called jagra, they mitigate pains in the belly, especially in women; and the same effect follows from the use of the bark levigated with vinegar, or swallowing the kernel stripped of its red pellicle. The juice of the leaves taken with oil mitigates venereal pains; drank with an infusion of rice, it flops fluxes: made into a castaplain with the leaves of betal it destroys worms in old ulcers; and worked with oil, it cures the piora and itch.

ERYTHRINUS, in ichthyology, a species of Sparus.

ERYTHROIDES, in anatomy, the 2nd of the proper tunics or coats which cover the teeth. ERYTHRONIUM, dog's tooth violet; a genus
ERZ [717] ESC

ESARHADDON, the son of Sennacherib, and his Esarhaddon successor in the kingdom of Assyria. He is said to have reigned 29 years at Nineveh, from the year 7294 to 7232; besides which he reigned 13 years at Babylon, in all 42 years. He died in the year of the world 3336, and was succeeded by Sargonchus. Esarhaddon, in the opinion of Sir Isaac Newton, seems to be the Sardanapalus who died, as Ctesarchus says, of old age, after the revolt of Syria; the name Sardanapalus being derived from Acherbaddon Pol.

ESCALADE, or Scalade, a furious attack of a wall or a rampart; carried on with ladders, to pass the ditch or mount the rampart; without proceeding in form, breaking ground, or carrying on regular works to secure the men.

When the troops are prepared to pass the ditch, either with the affittance of boards, hurdles, and falconets, when it is muddy, or with small boats of tin, or baleks covered with skins or oil-cloth, when it is deep and filled with water, a party must be placed on the countercarp, opposite to the landing-place, ready to fire at the garrison if they are alarmed, and oppose the mounting on the rampart. If the ditch is dry, the ladders are fixed in some place farthest distant from the centry; and as soon as they get upon the rampart, they put themselves in order to receive the enemy; if the centry should be surprised and silently overcome, the detachment hastens to break open the gate, and to let in the rest of the party. If the ditch is wet, the rampart high, and provided with a revetment, it will be difficult to surprise the town in this way; but if there is no revetment, the troops may hide themselves along the outside of the rampart till all are over. Since the invention and use of gunpowder, and the walls of cities have been flanked, they are seldom taken by escalade.

ESCALLONIA, in botany: a genus of the monogyenia order, belonging to the pentandria class of plants. The fruit is bilocular and polypermes; the petals distant and tongue-shaped; the stigma headed.

ESCAPE, in law, a violent or privy evasion out of some lawful restraint, without being delivered by due course of law. There are two sorts of escape, voluntary and negligent. Voluntary, when a man arraigned another for felony, or other crime, and afterwards lets him go freely by consent; in which case, the party that permits such escape is held guilty, committed, and must answer for it. Negligent escape, on the contrary, is where one is arrested, and afterwards escapes against the will of the person who arrested him, and is not pursued with fresh suit, and retaken before the person pursuing hath lost sight of him. By Stat. 8 and 9 Will. III. c. 26, the keepers of prisons conniving at escapes shall forfeit 50l. and in civil cases the theft is answerable for the debt.

ESCHALOT, or Shallot. See Allium.

ESCHAR, in surgery, the crust or scab occasioned by burns or caustic medicines.

ESHARA, in natural history, the name of a species of coralline, &c. the characters of which are these: they are of a fomy or coral-like hardness, and resemble a woven cloth in their texture; and the microscope informs us, that they consist of arrangements of very small cells, whose surfaces appear much in that form.

Linusæ
ESCHEAT, in law, signifies any lands or tenements that casually fall to a lord within his manor. It is one of the consequences of tenure in chivalry: (See Feudal System, Knight-Service, and Tenure.) It is the determination of the tenure or dissolution of the mutual bond between the lord and tenant, from the extinction of the blood of the latter by either natural or civil means: if he died without heirs of his blood, or if his blood was corrupted and stained by commutation of treason or felony; whereby every inherent quality was entirely blotted out and abolished. In such cases the land escheated or fell back to the lord of the fee; that is, the tenure was determined by breach of the original condition, expressed or implied in the feudal donation. In the one case, there were no heirs subsisting of the blood of the first feudatory or purchaser, to which heirs, alone the grant of the feud extended: in the other, the tenant, by perpetrating an atrocious crime, showed that he was no longer to be trusted as a vassal, having forgotten his duty as a subject; and therefore forfeited his feud, which he held under the implied condition that he should not be a traitor or a felon. The consequence of which in both cases was, that the gift being determined, repledged back to the lord who gave it.

The word escheat is sometimes used for the place or circuit within which the king or other lord is entitled to escheats: also for a writ to recover the same from the person in possession after the tenant's death.

ESCHEAT, in Scots law, is that forfeiture which is incurred upon a person's being denounced a rebel. See Law, Part III. No. cxxvi. 12.

ESCHEVIN, or Echevin (Scabinus), in the French and Dutch policy, a magistrate elected by the inhabitants of a city, to take care of their common concerns, the good order, convenience, and decoration of the city, &c.

At Paris there is a provoet and four eschevins; in most other cities a mayor and eschevins. In Languedoc, Provence, and Dauphine, they are called consuls; at Toulouse, capitouls and justices of peace; at Bordeaux, Haute-Cour or consuls.

Anciently the eschevins were the assessors and counsellors of the comites or judges of cities; on which account they were called in some places pairs, pairs; they even took cognizance of petty causes themselves.

Du Cange observes, that the judges and their assessors, who were chosen by the inhabitants, were called eschrakites or eschevins, and their college scabinom or eschevinage.

In Holland, the scabin or eschevin judge of all civil affairs at first hand. They also take cognizance of criminal matters; and if the criminal confess himself guilty, they can see their sentence executed without appeal. They can even give torture. The number is not the same in all cities; at Amsterdam there are nine, at Rotterdam seven, &c.

ESCHRAKITES, or ESRAKITES, a sect of philosophers, among the Mahometans, who adhere to the doctrines and opinions of Plato. The word is derived from the Arabic سحراک, which in the fourth conjunction سحراک, signifies "to shine, glitter like the sun;" so that Eschrakites seems to import "illuminated."

The Eschrakites, or Mahometan Platonists, place their highest good and happiest in the contemplation of the Divine Majesty; despising the gross imaginations of the Alcoran touching paradise. They are very careful in avoiding all vice; they prefer an equal an easy temper, love music, and divert themselves with composing little poems or spiritual songs. The sheikhs or priests, and the chief among the preachers of the imperial mosques, are Eschrakites.

ESCLAIRCISSEMENT, a French term, adopted in our language, signifying the explaining or clearing up of some difficulty or obscurity.

ESCORT, a French term, sometimes used in English authors, to denote a convoy or company of armed men attending some person or thing, in a journey or voyage, to defend or secure it from insults. Some derive the word from the Latin cohort.

ESCUADEC, or SQUAD, is usually the third or fourth part of a company of foot; so divided for mounting guards, and for the more convenient re-
lieving of one another. It is equivalent to a brigade of a troop of horse. See Brigade.

Escuage, in ancient customs, a kind of knighthood, called service of the shield, by which the tenant was bound to follow his lord to the wars at his own charge. See the articles Chivalry, Feudal System, and Knight-Service.

Esculapius. See Esculapius.

Esculent, an appellation given to such plants or the roots of them as may be eaten: such are beets, carrots, artichokes, leeks, onions, parsnips, potatoes, radishes, carrots, &c.

Escorial, a royal residence of Spain, situated about 15 miles north-west of Madrid. It is the largest and most superb structure in the whole kingdom, and perhaps one of the finest in Europe. The word is Arabic, meaning "a place full of rocks." It is built in a dry barren spot, surrounded with rugged mountains, so much that every thing which grows there is owing to art. This place was chosen, it is said, for the sake of the stone wherewith the fabric is built, which is got from a mountain just by, and is very durable, and the design of erecting it was to commemorate a victory which Philip II. obtained over the French (but by the affidavit of the original forces) at St Quentin, on St Lawrence's day, in the year 1557. The Spanish description of this structure forms a large quarto volume, and it is said that its founder expended upon it six millions of ducats. The apartments are decorated with an admirable variety of paintings, sculpture, tapestry, ornaments of gold and silver, marble, Jasper, gems, and other curious stones, far surpassing all imagination. This building, besides its palace, contains a church, large and richly ornamented; a mausoleum; cloisters; a convent; a college and a library, containing about 30,000 volumes; besides large apartments for all kinds of arts and mechanics, noble walks, with extensive parks and gardens, beautified with fountains and costly ornaments. The fathers that live in the convent are 200, and they have an annual revenue of 12,000L. It was begun by Philip in 1563, five years after the battle; and completed in 22 years. It consists of several courts and quadrangles, which altogether are disposed in the shape of a gridiron, the instrument of the martyrdom of St Lawrence; the apartment where the king resides forms the handle. The building is a long square of 640 by 560, and the height up to the roof is all round 60 feet, except in the garden side, where the ground is more taken away. At each angle is a square tower 200 feet high. The number of windows in the west front is 200; in the east front 366. The orders employed are Doric and Ionic. There are three doors in the principal front. Over the grand entrance are the arms of Spain, carved in stone; and a little higher in a niche, a statue of St Lawrence in a deacon's habit, with a gilt gridiron in his right hand, and a book in his left. Directly over the door is a baffle relieve of two enormous gridirons in stone. This vast structure, however, with its narrow high towers, small windows, and steep sloping roof, exhibits a very uncouth style of architecture; at the same time that the domes, and the immense extent of its fronts, render it a wonderfully grand object from every point of view. The church, which is in the centre of all, is large, awful, and richly but not affectedly ornamented.

The cupola is bold and light. The high altar is composed of rich marbles, agates, and Jasper of great rarity, the produce of this kingdom. Two magnificent catafalques fill up the side arcades of this sanctuary: one the emperor Charles V. his wife, daughter, and two sisters, are represented in bronze, larger than life, kneeling; opposite are the effigies of Philip II. and of his three wives, of the same materials, and in the same devout attitude. Underneath is the burial-place of the royal family, called the Pantheon. Twenty-five steps lead down to this vault, over the door of which is an inscription, denoting, that

His locus, festa morialitatis est, Caelitorum Regum, &c.

was intended by Charles the emperor, resolved upon by Philip II. begun by Philip III. and completed by Philip IV. The mausoleum is circular, 36 feet diameter, incrusted with fine marbles in an elegant taste. The bodies of the kings and queens lie in tombs of marble, in niches, one above the other. The plan of these sepulchres is grand, and executed with a princely magnificence; but, as a modern traveller observes, in a style rather too gay, too light, and too delicately fitted up for the idea we are apt to form of a chapel designed for the reception of the dead. The collection of pictures dispersed about various parts of the church, facility, and convent, has been considered as equal, if not superior, to any gallery of Europe except that of Dresden. Formed out of the spoils of Italy, and the waifed cabinet of that unfortunate delineator Charles I. of England, it contains some of the most capital works of the greatest painters that have flourished since the revival of the art. In the facility is an altar called La forma; this is a kind of tabernacle or scutcheon of gems, marbles, woods, and other precious materials, inlaid in gilt bronze; in which, rather than in the excellence of the workmanship or taste of the design, consists the merit of this rock of riches. Before it hangs a curtain, on which Coello has represented Charles II. and all his court in procession, coming to place this forma. This is esteemed one of the most curious collections of portraits in the world; for all the persons are drawn with the greatest strength of colour and truth of expression, and are said to be perfect resembances not only of the monarch and grandees, but even of the monks, servants, and guards. The figures, busts, and medallions of the Escorial, are not in an great number, nor very remarkable for their excellence; but the library contains a most precious collection of manuscripts, many fine drawings, and other curiosities. Withstanding the coldness of the exposure, the late king, for the sake of hunting, used to pass here several months of the year; and to make the place less inconvenient to his attendants, and the nobility, he built an entire new town adjoining to it.

Escutcheon, or Scutcheon, in heraldry, is derived from the French ecu, or shield, and that from the Latin scutum, and signifies the shield whereon coats of arms are represented.

Most nations of the remotest antiquity were wont to have their shields distinguished by certain marks painted on them; and to have such on their shields was a token of honour, none being permitted to have them till they had performed some honourable action.
ESO [ 720 ]

The eels, or as used at present, is square, only rounded off at the bottom.

ESDRAS, a Jewish priest, and doctor of the law. Artaxerxes Longimanus sent him with rich presents for the use and ornament of the temple of Jerusalem, rebuilt under Zerubbabel: the king also ordered the neighbouring governors to provide him with what conduced to the pomp of the Jewish religion, and to exempt the priests from paying taxes. He is supposed to have been the collector of the Canon of Scripture; and that, by divine inspiration, he added some things which happened after the deaths of the authors. It is guessed he wrote the Chronicles, besides those books which bear his name, the two last of which are exploded even by the church of Rome.

ESK, the name of several rivers both in England and Scotland, particularly of one which forms part of the boundary between the two kingdoms. It runs from north-east to south-west, and gives name to the county of Eildale.

ESKI-HISSAR. See STRATONICEA.

ESKINAUX. See ESQUITIUS.

ESNE, a considerable sea-port town of Upper Egypt. It is governed by an Arabian prince, and by a cæarch, dependant on the bay of Girze. The Mahometans have several mosques here, and the Copts a church served by two priests. "Eenie (says Abulfeda), remarkable for its public baths and its commerce, is built on the westward of the Nile, between Abouan and Cones, but nearer to the latter. It acknowledges, adds the geographer of Nubia, the Copts for founders. Its well cultivated territory abounds in grain and palm trees. It is surrounded by gardens filled with fruit trees. One admires here several ancient monuments constructed by the Copts, and superb ruins." This description answers to Eenie in our time, which is situated on the edge of a rich country and shaded by groves of orange trees loaded with fruits and flowers. This town, formerly called Lateopolis, revered Minerva and the fish Latini (Strabo). It contains within its boundary an antique temple: thick walls inclose it on three sides. Six large fluted columns, crowned by a capital ornamented with the palm leaf form the façade of it; 18 others support the roof, which is composed of large squares of marble; the building is surrounded by a freeze, and innumerable hieroglyphics cover its exterior aspects.

A little to the south of the town are seen the ruins of a monastery founded by St. Helena, and near it the burying-place of the martyrs, adorned with tombs crowned by cupolas, supported by arcades. The inhabitants of Eenie having revolted against the persecution of Diocletian, that emperor destroyed this town and put them to the sword. This place, consecrated by religion, is become a celebrated pilgrimage among the Copts. They repair thither from the most distant provinces of the kingdom. In the chain of mountains which stretches to the eastward of the Nile, and nearly opposite Eenie, are quarries of a soft stone, called Barum. It is made use of for kitchen utensils. It hardens in the fire, and forms excellent kettles and pans, which give no bad taint to the victuals.

ESOX, In Ichthyology, a genus of fishes belonging to the order of abdonimales. The body is elongated; the head is plain, and shorter than the under one, which is dotted: and the branchiopoe membrane has from seven to twelve rays.

The Lucites or Pike, has a flat head: the upper jaw is broad, and shorter than the lower: the under jaw turns up a little at the end, and is marked with minute punctures. The teeth are very sharp, disposed only in the front of the upper jaw, but in both sides of the lower; in the roof of the mouth, and often in the tongue. The slit of the mouth, or the gape, is very wide: the eyes small. The pike is common in most of the lakes of Europe; but the largest are those taken in Lapland, which, according to Scheffer, are sometimes eight feet long. They are taken there in great abundance, dried, and exported for sale. The largest fish of this kind found to be caught in England, weighed 35 pounds. All writers who treat of this species bring instances of its voracity. It hath been known to choke itself by attempting to swallow one of its own species which proved too large a morsel. Yet its jaws are very loose, connected, and have on each side an additional bone like the jaw of a viper, which renders them capable of greater dexterity when it swallows its prey. It does not confine itself to feed on fish and frogs, it will devour the water-rat, and draws down the young ducks as they are swimming about. But there are instances of its feracities fish more surprising, and which indeed border a little on the marvellous. Gefner relates, that a famished pike in the Rhone, seized on the lips of a mule that was brought to water, and that the beast drew the fish out before it could disengage itself; that people have been bit by these voracious creatures while they were washing their legs; and that the pike will even contend with the otter for its prey, and endeavour to force it out of its mouth. Small fishes throw the same uneasiness and detestation at the presence of this tyrant, that the little birds do at the sight of the hawk or owl. When the pike lies dormant near the surface, as is frequently the case, the little fish are often observed to swim around it in vast numbers and in great anxiety. Pikes are often halted in a noose, and taken while they thus lie asleep, as they are often found in the ditches near the Thames, in the month of May. In the shallow water of the Lincolnshire fens they are often taken in a manner, we believe, peculiar to that country and to the island of Ceylon. The fisherman makes use of what is called a crown nut; which is no more than an hemispherical baffet, open at top and bottom. He stands at the end of on of the little fen-boats, and frequently puts his baffet down to the bottom of the water; then poking a stick into it, discovers whether he has any booty by the striking of the fish; and vast numbers of pike are taken in this manner. The longevity of this fish is very remarkable, as we may credit the accounts given of it. Rzaczynski tells us, of one that was 90 years old; but Gesner relates, that in the year 1497, a pike was taken near Halbrum in Suabia, with a brazen ring affixed to it, on which were these words in Greek characters: "I am the fish which was first put into this lake by the governor of the univers, Frederick the Second, the 5th of October 1235." So that the former must have been an infant to this Methusalem of a fish. Pikes spawn in March or April, according
When they are in high season, their colours are very fine, being green, spotted with bright yellow; and the gills are of a most vivid and full red. When out of season, the green changes to a grey, and the yellow spots turn pale.

2. The Bélone, or Gar, some times grows to the length of three feet or more. The jaws are very long, slender and sharp-pointed; the under jaw externus much farther than the upper; and the edges of both are armed with numbers of short and slender teeth; the tongue is small; the eyes are large; the irides silvery; the nostrils wide and round. The body is slender, the belly quite flat, bounded on both sides by a rough line. The tail is much forked. The colours are extremely beautiful when the fish is in the water; the back is of a fine green, beneath which appears a rich changeable blue and purple; the sides and belly are of a fine silvery hue. This fish, which is found in many places, is known by the name of the sea-needle. It comes in shoals on our coasts in the beginning of summer, and precedes the mackerel; it has a resemblance to it in taste; but the light green which stains the back-bone of this fish gives many people a disgust to it.

3. The Sauris, or Saury, is 11 inches in length: the nose slender; the jaws produced like those of the sea-needle, but of equal length: the eyes large: the body anguilliform; but towards the tail grows suddenly smaller, and tapers to a very inconsiderable girth. The tail is much forked: the back dusky: the belly bright and silvery. Great numbers of these fish were thrown ashore on the sands of Leith near Edinburgh, after a great storm in November 1768. Aiton describes this species among the fish of the Mediterranean, but speaks of it as a rare kind.

4. The Barracuda of Cadesby, is found in great numbers about the seas of the Bahamas and as far as Jamaica. Its body and head very much resemble the European pike: the eyes are large: the mouth is very wide: the under jaw longer than the upper: there are four very large and sharp teeth in the front of the upper jaw; in that of the lower, a single great and sharp tooth: there are two dorsal fins; the tail is large and forked: colour a deep brown, whithlin on the belly. It grows to the length of 10 feet. It swims exceedingly swift, and is of dreadful voracity: will attack and devour men when they are bathing. The flesh has a disagreeable smell and taste, and is frequently poisonous: causing great sickness, vomiting, intolerable pains in the head, and loss of hair and nails: yet she hungry Bahamans formerly were under the necessity, at times, of feeding on it.

Espaliers, in gardening, are rows of trees planted about a whole garden or plantation, or in hedges, in such a manner as to incline quarters or separate parts of a garden; and are trained up regularly to a lattice of wood-work in a clofe hedge for the defence of tender plants against the injuries of wind and weather. They are of admirable use and beauty in a kitchen garden, serving not only to shelter the tender plants, but to screen them from the sight of persons in the walks.

The trees chiefly planted for espaliers, are apples, pears, and some plums; some plant apples grafted upon paralladie-stocks: but as these are of short duration, it is better to plant those grafted upon crabstock, or upon what the gardeners call Dutch-stocks; which will Espalade, both caufe them to bear sooner, and prevent their growing too luxuriant. The beet kind of apple for this purpose, are the golden pippen, nonpareil, rennet, &c. and the beet fort of pear, are the jargonelle, blanquette, &c. These last, if designed for a strong moist soil, should be grafted upon quince-stocks; but if for a dry soil, upon free-stocks.

While the trees are young, it will be sufficient to drive a few stakes into the ground on each side of them; fastening the branches to these in an horizontal position as they are produced. This method will do for the three first years: after which an espalier should be made of six poles, whereof there must be two forts, larger and smaller; the former to be driven uprightly into the ground a foot and a half, the latter, and the six poles, to be nailed across these, at about nine inches. Some prefer to this another fort of espalier, made of square timber cut to any size: these are, indeed, more lightly, but withal vastly more expensive.

When the espaliers are thus framed, the branches are to be fastened to it with oyster-twigs, observing to train them in an horizontal position, and at equal distances. Fruit-trees thus managed are preferable to any others; not only as bearing better-raifed fruit, but as taking up very little room in a garden, so as to be less hurtful to plants which grow in the quarters.

Espalade, in fortification, the flopping of the parapet of the covered-way towards the campaign.

Espalies, in law, the general products which lands yield, or the profit or commodity that is to be taken or made of a thing.

Espousals, in law, signifies a contract or promise made between a man and a woman to marry each other; and in cases where marriages may be confirmed espousals go before. Marriage is termed an espoufal de present.

The espousals among the Jews were either by writing, or by a piece of silver given and received, or by cohabitation. Amongst the Greeks, after the parents and friends of the young couple had witnessed their agreement by a kiss or the profit or commodity that is to be taken or made of a thing.

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Amongst the Romans the espousals consisted in an engagement of friends on both sides, whether absent or present, in public or without witnesses. But the common way was by writings drawn up by common consent, and sealed by both parties; besides this, the man sent a ring to the woman, confenting of iron and without a fone.

Equisilium, one of the seven hills of Rome, which Varro will have to be two, viz. Ciprus and Oppius; also Mons Equilium, softened from Exequilium; and this again from Exequilus, the watch or guard Romulus kept here, from a jealousy he entertained of his colleague Titus Tatius. On the east side it reached the city walls; on the south the Via Lavinia; on the west, the wide valley between mount Coelius and the Palatine; on the north, the Mons Viminalis; on the east side was the Porta Equi. This hill by some of the ancients was called Suburrimus, from the
ESSA

ESSA

Equimaux street Suburra to the north of it: by the poets, Efiuui-

ESSQUAUX, a people of North-America inhabiting all that vast tract of land known by the name of Labrador or New Britain.—They differ very considerably both in aspect and behaviour, from the other American nations; agreeing in most respects with the inhabitants of West-Greenland. See New Britain, and Greenland.

ESQUIRE (from the French esquis, and the Latin equestum, in Greek ovos, which signifies an horse, of which shields were anciently made, and afterwards covered; (or, in the time of the Anglo-Saxons, the shields had a covering of leather), was originally he who, attending a knight in time of war, did carry his shield; whence he was called equester in French, and vestifer, or armiger, i.e. armour-bearer, in Latin. However says, that those whom the French call esquiers, were a military kind of valets, having jus equester in French, and vestifer, viz. liberty to bear a shield, and in the enemys of their family, in token of their gentility or dignity. But this addition hath not of long time had any relation to the office or employment of the person to whom it hath been attributed, as to carrying of arms, &c. but hath been merely a title of dignity, and next in degree to a knight. For those to whom this title is now due, fee the article Commons

OFFICERS of the king's courts, and of the king's household, counsellors at law, judges of the peace, are only esquiers in reputation; and he who is a justice of peace has this title only during the time he is in commission, and no longer, if he is not otherwise qualified to bear it. A sheriff of a county being a superior officer, bears the title of esquire during his life; in respect of the great trust he has in the commonwealth. The chief of some ancient families are esquiers by prescription; and in late acts of parliament for poll-money, many wealthy persons commonly reputed to be such, were ranked among the esquiers of Great-Britain.

There is a general opinion, that every gentleman of landed property who has L. 300 a year, is an esquire; which is a vulgar error: for no money whatsoever, or landed property, will give a man properly this title, unless he comes within one of the above rules: and no person can attribute this title where it is not due, unless he pleases; there being no difficulty in drawing the line by the accounts given above and in the article Commons: but the meaner ranks of people, who know no better, do often falsely prostitute this title, and, to the great confusion of all rank and precedence, every man who makes a decent appearance, far from thinking himself any way ridiculed by finding the supererogation of his letter thus decorated, is fully gratified by such an address.

Esquires of the King, are such as have that title by creation, wherein there is some formality used, as the putting about their necks a collar of SS, and befitting on them a pair of silver India, &c.

ESKRITES. See Escharites.

ESSAY, a trial or experiment for proving the quality or state of any metal, or an attempt to learn, whether or not any invention will succeed.

ESSAY, in literature, a peculiar kind of composition, the character whereof is to be free, easy, and natural; not tied to strict order or method, nor worked up and finished like a formal system.

ESSAYING, or Assaying, in chemistry and metallurgy, signifies the examination of a small quantity of any ore or mineral by fire, in order to discover its contents. This is very necessary for those who intend to deal largely in metallic operations, in order to avoid unnecessary expense, by becoming previously acquainted with the nature of the ore.

The first attempts in this way were no doubt ex-History of extremely rude; but succeeding trials have advanced it to the form of a science or art practiced by numbers of people under the title of esay-masters. No treatise was published on this subject till after the middle of the 13th century; and the first book we have upon it is attributed to Lazarus Ecker, which appeared in 1574. Agricola, however, in his seventh book De re Metallica, published in 1567, described both the instruments and processes, illustrating the whole with plates; and there is incontrovertible evidence that this treatise had been presented to the elector of Saxony in 1567, tho' it did not appear to the world till after the publication of Ecker's book. Since that time, the art has been greatly improved; but the operations in the dry way are not materially different from those described under the title of Ecker. The blow-pipe likewise affords an excellent method of examining small quantities of metal, introd. in the dry way; but the greatest improvement hitherto made is that of assaying by the moist way, introduced by Mr. Bergman.

This celebrated chemist observes, that in the Doe-Maia Sicca, or assaying in the dry way, three things are for assaying requisite: 1. That the metal contained in the ore be all reduced to a complete form; for much part of it as is deficient in that respect cannot be united with the liquefied metal. 2. That the whole be collected into one mass; for when it is dispersed in numerous small grains, some of them are very easily scattered, and diminish the weight. 3. That the metallic form be preserved; for the extracted regulus must inevitably be diminished more or less by calcination. All these requisites are frequently effected conveniently enough in a crucible by fusion with proper strata of charcoal, provided the ore is free from sulphur and other volatile mixtures, and is entirely without a matrix, or united to one that can be melted by a moderate degree of heat; but if the matrix be refractory, notwithstanding the most subtle pulverisation, it will cover many of the metallic particles, and thus the reduction and fusion will be in some measure prevented. When this happens to be the case, we must add such other substances as not only promote fusion, but make the matter flow sufficiently thin to allow the regulus particles to fall to the bottom. These substances, which from the effect they have on the matter are called fluxes, are of a saline nature, and must therefore necessarily corrode the metals more or less; and hence the scoria, which are almost always ringed, contain a quantity of calcined metal. But as long as we are desirous of a sure method of measuring intense degrees of heat, and as long as it is necessary to perform the operation in close vessels to prevent the access of air, the force and proper continuance of the fire will be uncertain.
Hence we may conclude, that the goodness of the ore, formed from the weight of the regulus, must be fallacious, or at least somewhat inaccurate.

Hence we may understand, that experiments upon ores made in the dry way, are liable to many faults and imperfections; to which we may add the following, viz: that a given quantity of ore subjected to trial almost always exceeds in weight the regulus to be extracted from it. Now, since it is impossible to avoid a certain loss both during calculation and fusion, this loss will be the more remarkable, as the mafs to be weighed becomes ultimately lighter. The case is quite otherwise with experiments made in the moist way; for here the weighty sediment, from which the quantity of the contents is judged, is never less, but often greater, than that obtained by fire.

In the attempts made to effay ores in the humid way previous to those of Mr Bergman, both methods were used, the metallic part being extracted by a menstruum, and afterwards reduced by fire. Our author, however, has now shown a method of performing the operation without either calculation or fusion. "It must indeed be confessed (says he), that experiments in the humid way often require more care and pains than the other; but if accurate conclusions are thereby obtained, we ought not to grudge the small. Besides, in many cases this method is more expeditious than the other; and indeed almost always, if we content ourselves with such discoveries as can be made by the common calculations and fusions: may, sometimes the dry method is obviously sufficient, when the metallic content is either very small or volatile; but particularly if it be insaluble, as is the case of zinc."

In this method the ore to be examined should be reduced to a very subtle powder by pulverization and calcination. In diffusing such ores as contain sulphur, we ought to employ the vitriolic or marine acid; for the nitrous, by long continued heat, destroys the sulphur. Too great heat also dilutes some of it in vapours, or melts it into globules containing heterogeneous matters; therefore boiling ought to be avoided where it can be done. All the precipitates must be carefully collected, washed, and dried. Diluted liquor ought constantly to be used, and all the menstrua carefully depurated. Vitriolic acid our author calls diluted, when its specific gravity is below 1.3, the nitrous when below 1.2, and the marine when below 1.1. The precipitations should be carefully made in glass vessels; so that nothing may remain either through the deficiency of the precipitant, or be redeposited through its too great quantity. The clear liquor is to be decanted from the precipitate, water poured on in its place, the vessel shaken, and then suffered to stand; the water again decanted off, and more poured on in its stead, until it will no longer affect certain precipitants by which it must be examined. The sediment is then to be collected on a filter, the latter being previously weighed, and made of paper not impregnated with alum. It is to be dried at first with a gentle heat, but afterwards exposed for five minutes to a heat of 100°.

On cooling, it is to be weighed together with the filter; the known weight of which must afterwards be subtracted. The sediment is best washed in a bottle for a filter when once impregnated with saline matter cannot be freed from it again without great difficulty, especially if an interval of some hours intervenes.

The alkali made use of in Mr Bergman's experiments, was that of soda faturated with aerial acid. His phlogisticated alkali is made by distilling equal weights of pure nitre and cream of tartar intimately mixed together; the residue is the common white flux.

Half an ounce of this is dissolved in half a quadrans of distilled water. To this heat a digesting heat, two ounces of Prussian blue, carefully avoiding such an effervescence as may throw any thing over, which easily happens if the quantity be too large. The pigment soon looses its beautiful blue colour, growing not red but black; which shows that a decomposition has taken place. The Prussian blue used in his experiments contained in 100 parts only 23 of the pigment and 77 of the clay; so that if we employ the blue made without any earth, 221 grains of it will faturate the half ounce of alkaline salt more completely than the two ounces of the kind already described. But in whatever manner the operation is performed, after the addition of the last quantity, the whole must be exposed to a stronger digesting heat, and fined with a wooden spatula. If the liquor be too much diminished by evaporation, the defect must be supplied by adding more water. When the liquor becomes clear, the residuum must be collected upon filtering paper, and gradually washed with warm water until all the soluble part is extracted; when, if the operation has been properly conducted, the filtered liquor amounts to a whole quadrans, of a brownish yellow colour, and so well faturated with colouring matter, that it does not change the colour of paper tinged with Brazil wood. This lixivium, however, contains a small quantity of Prussian blue, about 4 lb. to a cwt. of the alkali. These should be previously separated by an acid, or, which is better, corrected by subtracting from the weight of the sediment 16 cflay pounds for each quadrans of the lixivium. When we wish to examine the colour of the precipitate exactly, however, the lixivium and the precipitate made of it, must be well separated; for by neglecting this precaution we may easily persuade ourselves that any metal precipitated by the lixivium has a blue colour. When we only wish to ascertain the weight, the lixivium, having the small proportion of Prussian blue intermixed, may be employed; but still the proper correction must ultimately be made use of; for the precipitating acid is wont to impair the qualities of the lixivium, and even to destroy them altogether, especially in a warm temperature. Calcareous earth, whether in its mild or caustic state, is also capable of subtracting a coloured tincture from iron and other metals.

In the precipitation of metals by metals, it is to be observed, that the acid of the solution ought to be precipitate somewhat predominant; but any considerable excess of metals by must be corrected occasionally, either by alkali, water, or spirit of wine.

(A) The newly invented thermometer of Mr Wedgwood has furnished us with a method of measuring intense degrees of heat; but we have not yet heard how far this has been found useful in practice.
In the following experiments an effay cwt. was always employed; unless where it is expressly mentioned otherwise: conclusions sufficiently accurate may indeed be obtained from 25 lb; nay sometimes from smaller quantities. In these cases our author mentions the usual quantity; applying to them those formulae of calculation which are founded on the mutual proportions of the proximate principles constituting metallic salts. By an easy substitution, the same formulae may be used by those who employ 1/2 or 1 cwt. We now come to describe the method of effaying the ores of the particular metals.

1. Ores of Gold. This metal occurs in the bowels of the earth native, posing a complete metallic form, although in general the small particles of it are interfered in various matrices, that they are entirely invisible. It is also found mineralized, or united with sulphur, by means of iron or some other metal. These two species of ore we shall consider separately.

Native gold is very seldom, if ever, free from heterogeneous matters; the most usual mixtures are copper, silver, and sometimes iron. The first of these remains in the menstruum, and may be separately collected by dissolving the gold in aqua-regia, and precipitating it by muriatic acid; the second falls during the solution, yielding a falsed silver; which, being wafted and dried, shows the weight of the silver contained and the iron may be discovered by phlogification of alkali. The precipitate occasioned by muriatic vitriol is pure gold in its metallic state, but very fubtilly divided, and therefore its weight requires no correction.

Hence it appears how small a portion of gold inherent in the ores of other metals may be extracted; besides a solution containing the most minute particle of gold instantly produces the purple precipitation of Caffius, with a solution of tin properly prepared.

2. Ores of this metal properly called.

As to the ore which contains gold adhering to and surrounded by fomy particles, 1. We must reduce a determined weight to an impalpable powder, by trituration and elution. Then let the powder, weighed a second time, be boiled in aqua regia, as long as anything is taken up by the menstruum; after which, let the exhausted ore, well wafted, be collected, exsiccated to ignition, and weighed. Let the clear solution (the colour of which, in some degree, affords a method of judging) be precipitated in the usual way by muriatic vitriol; the precipitate well wafted, dried, and weighed, shows the gold, which, added to the weight of the exhausted ore, ought to be equal to the original weight, unless somewhat has been dispersed by the pulverization, or unless some of the matrix has entered the menstruum. The former of these is discovered by comparing the weights before and after pulverization; the latter by precipitants.

When grains of gold are mixed with loose earthy particles, they are sometimes easily separated by mechanical application of water.

When the metal is mineralized by sulphur, as in the golden pyrites, let one or more easy cuss. reduced to powder be gently boiled in the nitrous acid, or rather digested in a heat of 70°—80°, left the sulphur should be destroyed. It is even necessary to employ a more gentle heat for this purpose, that the sulphureous particles, gradually separaring, may remain in their natural state; for if they melt, the heterogeneous particles which ought to have been removed, will be included in the melted mass. The menstruum ought to be added in several portions, about six times the quantity of the ore at each turn. The pyrites is acted upon by this menstruum; an effusoence ensues, which continues for some time; after which a fresh quantity of the acid is to be added, until the sulphur is obtained pure and of its proper colour. From 12 to 16 parts of the acid are usually required to one of the ore. The purity of the sulphur is easily ascertained by caustic alkali.

The matrix, if insoluble in the menstruum, remains at bottom, together with the gold, which is distinguished by its peculiar colour and splendour, and may be separated from the matrix by careful elutriation. The particles of gold assume the form of very small grains, yet such as have angular points discernible by a good eye; and their appearance gives some reason for supposing that they have rather been intimately mixed with the pyrites than dissolved in it. The clear solution, which is generally green, must be evaporated, made red hot, and then weighed. Any other metals that happen to be present besides iron, may be extracted by suitable menstrua; as copper by the volatile alkali, manganate by dilute nitrous acid, with the addition of a little fugar: zinc is scarce ever met with in gold pyrites; but if it should happen to exist, may be extracted by any menstruum; and silver by pure nitrous acid. Calcareous earth, when it happens to form the matrix, unites with nitrous acid, and clay with that of vitriol. The sum of the weights of all the ingredients ought to be equal to the original weight of the ore; and unless any has been Take a eature during the operation, any deficiency may be attributed to the conformation of the sulphur.

3. Ores of Silver. This metal, when found in its native state is generally alloyed with gold or copper, or both. The silver and copper will be taken up by nitrous acid, leaving the gold at bottom in the form of a black powder, which may be made to assume a more metallic appearance by solution in aqua-regia and precipitation by muriatic vitriol. The copper remaining in the solution may then be collected by means of iron or aerated alkali.

Silver united with sulphur alone (the glassy ore of mineral-silver) is of a black colour. To discover the contents and value of this ore, let it be divided and powdered as much as possible, and then gently boiled for an hour in 25 cws. of diluted nitrous acid; then after decanting the liquor, the operation is to be repeated with an equal quantity of the menstruum; and even a third time, unless the pure sulphur be now separated. The last particles of
the silver adhere obstinately to the sulphur. If any gold be present, it remains undisolved at the bottom of the vessel. The decanted liquors being collected, are to be deprived of the silver by adding common salt; then if we suppose the precipitate when collected, washed, and dried, to be \( \text{m} \) oz., the silver required will be \( \frac{\text{m}}{129} \) oz.

The weight of the sulphur added to the above ought to be 100 lb. If the operation has been rightly performed, and no decomposition of the sulphur taken place. The clear liquor, which paffes in filtering the luna cornes, easily discovers any other metal which may originally have been mixed with the silver; after which, the earth may be precipitated by means of a common fixed alkali.

It is difficult to separate the remains of the matrix from the sulphuritious particles. To effect this, however, let the sum of the weights be first observed; then pour on caustic lixivium, which will dissolve the sulphur by a gentle digetting heat; the matrix then remains alone, and by its weight we can determine that of the sulphur; but we must not continue the digestion longer than is necessary to dissolve the sulphur, lest some of the siliceous earth should also be taken up, tho' Mr. Bergman thinks there is no great reason to apprehend any inconvenience of this kind.

The red silver ore may be examined by reducing it to a very subtile powder, and boiling it twice gently in diluted nitrous acid. A part of the menstruum being decanted off, wash the residuum well, then precipitate the silver by means of sea-fart; boil the above-mentioned white powder quickly in aqua-regia, until the arsenic be dissolved and the sulphur appear pure. The yellow solution, cautiously decanted, lets fall a very white powder on the addition of a proper quantity; and the small quantity taken up by the water may be obtained by evaporating to dryness. The sulphur separated in this manner, though it seems pure, yet contains some silver which the nitric acid could not dissolve on account of the arsenic contained in the ore; but when this is taken away by the aqua-regia, the remaining parts of the silver adhere to the matrix and acid entangled among the sulphuritious particles. This luna cornes may be freed from the sulphur by caustic volatile alkali dissolved with water, and kept in a well-closed vessel for some days. A weight of alkaline liquor equal to that of the sulphur is sufficient. By weighing the sulphur both before and after the operation, we know the weight of it as well as the luna cornes. Iron may be discovered by means of the phlogisticated alkali.

The white ore of silver, confifting of the metal united with sulphur, arsenic, and copper, is effayed in the following manner. Let 1 cwt. of the ore, reduced to powder, be gently boiled for an hour in a little more than 12 times its weight of diluted nitric acid. The dry powder becomes black, foul, and fends forth the smell of hepar sulphuris. Part of it is dissolved, and a white residuum remains at length at the bottom. The liquor cleared by fubiding or filtration, contains the silver and copper; the former cannot be precipitated alone by sea-fart, because the marine acid attracts the copper more strongly. A white precipitate indeed, confisting of small needle-like crystals, is thrown down; but is found on examination to consist of a peculiar combination of marine acid, silver, and copper. The silver therefore must be precipitated by a determined weight of copper, and the latter may be afterwards separated by iron or mild fixed alkali; but from the ultimate weight we must subtract that of such part of the precipitant as has entered the menstruum. The white menstruum must next be boiled in marine acid, and precipitated by water; by which means we obtain the arsenic, along with a small quantity of marine acid which it retains obstinately. After the separation of the arsenic, it remains only to prove the purity of the sulphur by volatile alkali, in order to determine whether it still contains any luna cornes, or copper.

Silver mineralized by sulphur sometimes contains Mineral-antimony also; and this ore often appears in the red form of capillary threads of an hoary brown colour, phur. To analyze this, let it be gently boiled, or rather digested, for an hour, in six times its weight of diluted nitrous acid, until the silver is thoroughly disolved, and all the antimony reduced to a white calx; which, after decanting the liquor, may be separated from the sulphur by marine acid, and precipitated by water. The solution of silver may be precipitated by sea-fart, and 1 cwt. feldom contains more than four ounces. Sometimes there is present in this kind of ore a little copper and iron besides the sulphur and antimony; in which case we may conduct the experiment in the same manner, only with the addition of a double portion of acid. All the metals are easily obtained by precipitating the silver by copper, and the iron by zinc or an alkaline falt.

The corneous silver ore, in which the metal is mineralized by the marine and vitriolic acids, has two remarkable varieties; one of which may be cut, and is somewhat malleable: the other brittle, and containing some sulphur besides the acid. An hundred parts of the former, reduced to fine powder, is to be digested for one day in marine acid, shaking the mixture from time to time. The liquor is then to be decanted clear, and the residuum, previously well washed in water, added to the liquor. A solution of terra ponderosa is to be gradually dropped into the liquor, until it ceases to occasion any precipitation. Suppose the weight of the precipitate, washed and dried, to be: now vitriolated terra ponderosa, whose weight is \( a \), contains of acid \( 0.15a \), which corresponds with vitriolated silver \( 0.48a \); for from 1001. of vitriol of silver, 68.75 of metal is obtained by reduction. But as all the silver is not precipitated from nitrous acid by mineral alkali combined with vitriolic acid, the luna cornes will therefore be \( 100-0.48a \). In the former falt, the silver contained is expressed by \( 0.32a \); in the latter, by \( 75.19-0.26a \); and therefore the sum required for the 100 will be \( 75.19-0.26a \). The brittle corneous ore likewise contains sulphur; but the faltine part may be extracted by volatile alkali, and the quantity of metal afterwards ascertained by the method already described. Or this compound may be reduced in the following manner: Let the mass be mixed with an equal bulk of alkaline falt in a glass mortar, and be formed into a globule by means of a few drops of water: let this globule be put into a crucible, the bottom of which has been previously fired with talc fods, compressed and covered with the same alkali.
are founded, may be found in Bergman’s table of precipitates under the article Chemistry.

5. Ore of Lead. This metal, if ever found native, may be easily examined as to its purity by means of nitrous acid, which dissolves copper both by its blue colour and precipitation by iron; and silver is discovered by the addition of copper.

21. Native mercury. Native quicksilver is seldom mixed with any other metals than gold, silver, and bismuth. The first remains at the bottom on distilling the fluid mass in nitric acid; the second is discovered by sea-fault, which at the same time precipitates the mercury combined with sea-fault; and the third, though it is taken up by the spirit of nitre, is yet precipitated by the mere affusion of water.

The combination of quicksilver with sulphur (native cinnabar) cannot be decomposed either by vitriolic, nitrous, or marine acid. Our author has even attempted in vain to dissolve them by boiling for many hours in a solution of caustic fixed alkali in water. There are, however, he tells us, two ways of effecting a perfect decomposition; only by gently boiling for an hour the cinnabar with eight times its weight of aqua-regia, one fourth of which is marine acid; the other by boiling it in marine acid, with the addition of one tenth of the weight of the cinnabar of the black calc of manganese; but the former method is preferable, as no heterogeneous matter is thus added to the mercury. The mercury is in the same in both, viz. the dephlogified marine acid; the only difference is, that in the former method it is dephlogified by the nitrous acid, and in the latter by the manganese. In whatever manner, however, the sulphur be separated, it may be collected by a filter, and the mercury precipitated by zinc; copper precipitates mercury from the marine acid in a more imperfect manner. If the ore under examination be very much entangled in the matrix, it must be mechanically freed from it by burning; after which the soluble parts of the matrix being taken up by the nitrous, marine, or vitriolic acid, the metal itself is separated by aqua-regia.

When mercury is mineralized by the vitriolic acid, it may be separated by the help of the marine acid by triturating or digestion, and the metal precipitated by terra ponderosa dissolved in nitric acid; after which the weight of the new earthy salt a being given, we can easily learn the quantity of metal contained; yet, as solution of mercury in nitric acid is not totally precipitated by Glauber’s salt, we must not here depend on the weight of the precipitate. By another process, therefore, our author obtained from 100 lb. of vitriol of mercury 33,899 lb. of pure metal, and from an equal weight of corrosive submarine 75.5; from whence a calculation is easily deduced in the following manner. Let the quantity of vitriolic acid be \( a \); the vitriol of mercury containing this \( 0.44 a \); and the combination of mercury with marine acid, \( 100 - 0.44 a \).

In the former salt the mercury constitutes \( 0.29 a \), and in the latter \( 72 = 32 a \); so that the whole metallic content in 100 lb. is \( 72.5 - 0.03 a \). The scarcity of this ore, however, renders it still uncertain whether this combination of mercury with marine acid approaches to the nature of corrosive submarine or mercuric dulcis. In the latter case the calculation comes out different; for mercurius dulcis contains above 0.99 of metal, and the whole content is expressed by 91.18 \( a \times 0.29 - 0.40 = 91.18 - 0.114 \).

N. B. The weights on which all these calculations

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N. B. The weights on which all these calculations
suppose to weigh $a$; in which case the corresponding lead = $\frac{10a}{3}$. The liquor remaining after precipitation yields, on being evaporated, a phosphoric acid.

48 Copper.

6. Ores of Copper. This metal, when native, readily dissolves in nitric acid. Gold, when mixed with it, falls untouched to the bottom in form of a black powder. Silver is soon precipitated by copper, and iron, by boiling the solution for some time, and insipidating to dryness, is gradually calcined and falls to the bottom.

Copper mineralized by sulphur is to be powdered, and gently boiled to dryness in five times its weight of concentrated vitriolic acid. The residuum must then be well washed with water, until all the metallic part has entered the menstruum. The quantity of water used for the solution ought to be in some degree proportioned to the goodness of the ore; that which contains 0.05 of copper requires about 0.08 of water, and so on. A polished plate of iron, about twice the weight of the copper, is then to be immersed in the solution properly diluted, and the boiling continued until all precipitation ceases. If the quantity of water be too small, the precipitated metal adheres very obliquely to the surface of the iron plate; which, however, may always be freed by making use of a proper quantity of liquid. The precipitated copper, after being well washed, is to be speedily dried; "yet but yet (says our author) with such a degree of heat as to make the surface of the metal of different colours, which instantly and sensibly increases the weight."

Sometimes the precipitated copper is found mixed with iron, especially in a poor ore; in which case the precipitate must be redissolved in order to obtain a richer solution; and this deposit pure copper, if the operation has been properly conducted. A similar circumstance also takes place in the precipitation of silver by copper; a rich solution yielding the metal pure, but a poor one affording it mixed with copper. When the precipitated copper is alloyed with other metals, they may easily be separated by solution in the nitric acid. Gold, as has already been observed, remains at the bottom in form of a black powder, and silver is precipitated on a copper plate.

During this process almost all the sulphur is diffused, by the intense heat necessary for evaporating the vitriolic acid to dryness; however, we may judge of its quantity from the sum of the weights of the other ingredients, compared with that of the whole; or a solution in aqua-regia may be made on purpose for collecting the sulphur.

The beautiful green ores of copper called malachites, in which the metal is mineralized by fixed air, are totally soluble in acids, and may be precipitated by iron or aerated fixed alkali. In the latter case, supposing the weight of the precipitate to be $a$, that of the copper will be $\frac{10a}{3}$. Calcareous earth, when any happens to be present, may be thrown down by aerated alkali, and the metal precipitated by phosphated alkali.—Blue calciform copper, in which the metal is also mineralized by aerial acid, is to be analyzed in the same way. Calciform red copper is also totally or in great part dissolved with effervescence, though somewhat weaker than the other.

30 To separate iron from precipitated copper.

Malachite.

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Mr Bergman has examined by many different ways the red quartz of Mr Cronstedt, supposed to contain a red calx of copper. None of this metal, however, was extracted either by volatile alkali, or boiling the vitriolic acid to dryness upon it. As the fleshy matrices, however, cannot easily be dissolved by the common menstrua, a quantity of mineral flour was added to the vitriolic acid. The flour acid has the property of dissolving the particles of quartz, and letting at liberty those of copper which might be entangled among them; but though this experiment always succeeds when copper is present, yet in this substance the smallest sign of metal could be discovered, and therefore it is probable that Mr Cronstedt was mistaken.

7. Ores of Iron. Though some traces of this metal iron . . . are found almost everywhere in the mineral kingdom; yet the ores which contain it in considerable quantity, have it either mineralized by sulphur, or more or less calcined. Ores of iron are frequently found in Sweden so perfect that they obey the magnet, or are themselves magnetic. These attractive and magnetic ores, though they do not contain much sulphur, are yet seldom entirely without it, though more can be extracted by menstrua. Those saturated with sulphur are called sulphurous pyrites, nothing but sulphur being extracted from them; for though they sometimes contain the metal in sufficient quantity to pay the expense of smelting, it is always brittle and untractable in the fire, and is easily corroded by rust on exposure to the open air.

All the ores of iron, when reduced to a very sublimate powder, and repeatedly boiled in marine acid, part with their metal; the solution of the pyrites is accelerated by the addition of a small quantity of nitrous acid. In order to obtain the metal by itself, we must precipitate it by phlogisticated alkali; when, if we suppose the weight of the precipitate to be $a$, the corresponding quantity of metal will be $a^b_5$; but this must be corrected according to the quantity of the precipitant. That ore which is naturally soluble by vitriolic acid requires nothing but water to precipitate by means of phlogisticated alkali.

Manganese, which is frequently mixed with iron Mangane . . . may easily be discovered by immersing the blue sediment (carefully weighed) in water sharpened by nitric acid; by which means the part arising from the manganese is dissolved. Other metals sometimes enter the ore of iron in larger quantities; which for the most part render the former useless, by impairing bad qualities to the fuelcated iron.

8. Ores of Tin. The examination of native tin by the of native humid method is attended with no difficulty: for the addition of nitric acid quickly deprives it of its phlogiston, that it is reduced to the form of a white calx; the iron and copper, if any be present, remaining in the liquor. An hundred parts of tin corroded by nitric acid washed and dried, yielded 1.40 of calx. Arsenic may be separated by washing with large quantities of warm water; for little enters the acid menstruum. The other metals are but rarely united with native tin.

The pure ore, is commonly called, according to its pure . . . the magnitude of its crystals, sinnagraffen or zwiter, ore . . .

by.
by the Germans. These forms cannot be examined in the moist way without great difficulty, as they are not acted upon either by vitriolic, nitrous, or marine acid, or even by aqua-regia. The reason of this insolubility is, that the calx being well dephlogisticated, is either not taken up at all, or in very small quantity; and besides, being involved in strong particles, the menbrana can scarce have access to it. The following method is recommended by our author as one by which this process may be nearly effected.

"To a very subtle powder of the crystalline tin ore obtained not only by levigation but effusion, let there be added a quantity of concentrated vitriolic acid, and let this be exposed to a strong digesting heat for several hours; then pour on a small portion of concentrated marine acid; and upon agitating it, a voluminous effervescence immediately begins, with a considerable heat arising from the marine acid, which is partly deprived of its water by the vitriolic, and generates a marine acid air. By this method the forces of the two are conjoined: water is to be added in about an hour after, and the clear liquor decanted after the sediment has fallen. This operation is to be repeated with the residuum until the acids can diffuse no more. What remains finally dissolved is nothing more than the vitriolic matrix. Let the solution precipitated by means of aerated alkaline, and the quantity of regulus will be 100a. The subtle atoms of the crystalline ore, intimately mixed with any matrix, may, after due pulverification, be separated by washing from a given portion, as the crystals are nearly of six times the specific gravity of water; so that they not only exceed the gravity of the earthy particles, but that of the ores of other metals, and approach even to the lighter metals themselves. The crystalline particles, after being separated, are exposed to the trial above described. The larger distinct crystals can seldom be employed; the most common ore contains particles of them very much dispersed."

The adventitious metals usually found in tin are copper and iron.

9. Ores of Bismuth. This semi-metal, when native, is easily taken up by nitrous acid, and may then be precipitated by water; after which any other metals that happen to be mixed with the bismuth remain in the liquor, and may be separated by the methods already frequently described. When mineralized by sulphur, the ore is decomposed by slight boiling in the fame menstruum; so that the sulphur may be at last obtained; which when washed and collected is to be examined as to its purity and quantity. The solution of the metallic part precipitated by water leaves a white calx; and supposing its weight = x, that of the corresponding metal will be 100a.

Iron is sometimes met with in these ores, which may easily be discovered after the separation of the bismuth.

Bismuth in form of a calx, whether alone or mineralized by aerial acid, is also soluble in nitrous acid, and may be precipitated by water, upon which the heterogeneous matters remain in the liquor. The presence of cobalt is discoverable by its communicating a red colour.

10. Ores of Nickel. This substance, when found native, may be dissolved by the nitrous acid; and when precipitated by aerated alkali, yields a calx which always contains iron, arsenic, and cobalt, in the same proportions in which they usually accompany the regulus obtained in the common way. If silver and bismuth happen to be present, which, however, is very seldom the case, the former is to be precipitated by common salt before the latter is employed. Sulphur may be separated and collected during solution.

Nickel, mineralized by vitriolic acid, is scarcely mineralized without iron. A great part of the latter, however, is separated by long and violent boiling in water. Aerated alkali throws down a greenish white precipitate; and if we suppose the weight of this = a, that of the regulus nickel is 135. The same metal mineralized by aerial acid is dissolved by spirit of nitre, and may be precipitated by means of mild alkali.

11. Ores of Arsenic. The purity of native arsenic may be examined by dissolving it in four times its weight of aqua-regia, and the solution slowly evaporated without any separation of the metal. The arsenic is then to be precipitated by water, and collected upon a filter; the heterogeneous metals will be contained in the clear liquor which passes through the filter. If any silver be present, it falls to the bottom in conjunction with the arsenic acid. Iron is hardly ever absent altogether, and is frequently in such quantity, that the mass has a polished appearance, most commonly crystalline, and is commonly known by the name of mifpicket.

Arsenic mineralized by sulphur is to be dissolved in mineral acid, with the addition of the nitrous occasionally, in greater or lesser quantities, so that the sulphur may be separated from all metallic matter. The sulphur collected, washed, and weighed, indicates the quantity of the arsenical part. This, however, ought to be precipitated separately by water, and weighed; a step which is always necessary where great accuracy is required. Arsenic dissolved by marine acid may also be precipitated in its metallic form by zinc; the solution being previously weakened by spirit of wine. When sulphur alone is united to the arsenic by its different proportions, it produces different colours, from a dilute yellow to an intense red. But if a considerable portion of iron also enters the composition, a white colour is generated, and a very different species of pyrites formed, which is called the arsencal pyrites. This may be analyzed by solution in marine acid in the manner already described.

In analyzing arsenical ores in general, we must take care not to add too much nitrous acid, as we would acid of not much sulphur. If taken away the whole of the phlogiston, and diffuse the arsenical acid. The smallest quantity sufficient for solution ought therefore to be employed; otherwise water will occasion no precipitation; and even with all our caution, it is scarce possible to prevent a small portion of the arsenical acid from being diffused, especially if the boiling be long continued. This may be recovered by evaporating to dryness, though rarely alone, but united either with the alkaline earths or the metals which are present. Some of the arsenical easily flies off.

12. Ores of Cobalt. This semi-metal, when native, almost...
Union with vitriolic acid, along with a large
quantity of arsenic was separated and perhaps by solution in
water, as it differs from the native cobalt only in contain-
ing a small quantity of sulphur, which is to be separa-
ted and collected.

Cobalt has been discovered by Mr Brandt in a flake of
cobble stone with vitriolic acid, along with a large quantity
of iron, and without any arsenic. This may be exami-
ned by solution in aqua regia. The solution is yellow
with scarcely any reducing, on account of the great quan-
tity of iron. By boiling it affumes an oblique green, and
refumes its former colour; a property by which the exis-
tence of cobalt is always known. The ore does not appear to contain any sulphur; but a few drops of
solution of terra cotta dissolved in marines acid im-
mediately discovered the vitriolic acid. Scarcely any
veilge of arsenic was to be seen with. The vitriolic
acid, however, though present in such abundance, was
yet so far dephlogisticated, that it could not unite with
the femimetal into a vitriolated cobalt, and therefore
must be considered only as an impurity.

The trichetes of the Greeks, which is found in the
mines of Herrngrund and Ida, adhering to an argilla-
ceous slate, is found to contain a real cobalt, besides the
clay and vitriolic acid. It can only be precipitated
by the phlogisticated alkali.

Cobalt frequently exhibits beautiful red efflores-
cences, sometimes more dilute, and sometimes of a deeper
colour. Sometimes it appears like a loose powder, some-
times more concrect, and at times forming most beauti-
ful crystals radiating from a centre like a star. These
substances always shine some veltiges of arsenic: but as
this substance is incapable, either in its regiuline or cal-
cined state, of imparting a red colour to cobalt, it is
reasonable to suppose that it is done by the arffenical
acid itself, as all acids have the property of communi-
cating a red colour to cobalt. To determine this
point, Mr Bergman made the following experiments.

1. Having artifically combined the acid of arsenic
with cobalt, he found an exact resemblance between
this compound and the natural crystals above-mentioned.

2. On account of the scarcity of the latter substance,
estirred the pure acid of arsenic, first separating it
by vitriolic acid, and then absorbing the latter by high-
ly rectified spirit of wine, which takes upon it from the
superfluous acid, leaving the vitriolated cobalt untouched.

The black calx of cobalt is generally found concre-
cited into an hard mass, known by the name of the griff
ore of cobalt. This, when pulverized, may be dissolved
in the marine acid or aqua-regia, and examined like the
former.

13. Ores of Zinc. If ever this femimetal occurs in a
native state, its purity may be easily determined, as it
is readily fusible in all the acids; and whatever hetero-
genous metal is present may be precipitated by zinc.

The pseudo-galena which contains zinc mineralized
by sulphur, together with iron, must be carefully treat-
ed with nitrous acid, in order to extract the metallic
part without decomposing the sulphur. If no other
metal than iron be present, it may be precipitated by
zinc; but if others also are combined with it, the iron
must be calcined, by repeatedly abstracting nitrous acid
to dryness and a new solution, made by vinegar or any
other acid, examined.

To analyze the combination of vitriolic acid and
zinc, dissolve the salt in water, and precipitate the solu-
tion with mild fixed alkali, when, if the weight of the
precipitate be $a$, that of the regulus will be $\frac{100}{a}$. When
iron is present, as is usually the case, it ought to be
precipitated by a known weight of zinc.

This femimetal, mineralized by aerial acid, ought to
be dissolved in some of the mineral acids, and then pre-
ecipitated by phlogisticated alkali, or mild fixed alkali.

When the former is employed, the weight of the sedi-
ment must be divided by $s$, in order to ascertain that
of the metallic part.

14. Ores of Antimony. The purity of this femimetal,
when found native, may be examined by reducing it
to a calx with strong nitrous acid; in which case, if
it has been entirely pure, there will remain only a small
part dissolved in the water, and which will separate on
the addition of water. When mineralized by sulphur,
the metallic part is taken up by aqua-regia, and the
sulphur remains pure. The solution, by boiling with
strong nitrous acids, lets fall a calcined antimony; which
being separated, the remaining liquor may be examined
by phlogisticated alkali or otherwise at pleasure.

By the addition of a certain quantity of arsenic, crude antimony grows red, frequently exhibiting beau-
tiful fusciules of filaments radiating from a centre. The
presence of arsenic may be discovered by gently boiling
the powder in aqua-regia until the sulphur be obtained
pure. The arsenic and antimony are contained in the
clear solution, and may be separated in the following
manner. Let concentrated nitrous acid be poured on,
and the antimony reduced to a white calx by boiling.

Let this be collected on a filter; and the liquor that
passes through affords arsenic by evaporation, but
generally deprived of phlogisation, or reduced to the state
of arfenical acid. As the caustic alkali also takes up
both sulphur and antimony, it may be advantageously
employed, especially for the separation of silver, or
other metals which do not yield to this menstruum. A
hepar sulphur is indeed produced; but in this case it
dissolves little or nothing.

15. Ores of Manganeze. This femimetal accompanies
Manganeze most of the ores of iron, though it has likewise ores
of its own in which it predominates, but seldom to be
met with. It has never been found native or mineral-
ized by sulphur, but commonly occurs in the form of
a calx, generally alone and black, though sometimes
mineralized...
ESS [ 730 ]

Effaying, mineralized by the aerial acid. These ores, after being reduced to a sublimate powder, must be immersed in any acid, particularly one of the mineral kind, together with a small piece of silver, in order to dissolve the phlogiston necessary for dissolving the manganese. Fresh acid is to be poured repeatedly on the calx with silver, until no more can be extracted by a digesting heat; after which the solution is to be precipitated by mild alkali; and if we suppose the weight of the sediment = $a$, that of the corresponding regulus will be $\frac{100}{180}$. The insoluble residuum at bottom either contains heterogeneous mixtures or belongs to the matrix.

Combined To separate the iron from calx of manganese combined with aerial acid, nitrous acid is to be repeatedly abstracted from the ore, and the heat, after each addition, increased to ignition; after which the manganese will be obtained pure, or at least contaminated with iron in a much smaller degree than before. It may then be separated by fusing concentrated vinegar or diluted nitrous acid. Manganese when precipitated from superabundant nitrous acid by phlogificadosalkali, totally dissolves in distilled water; which property affords likewise a method of separating it perfectly from iron.

Method of effaying silver and gold. Besides the foregoing kind of operations which reduces to theoreum metals, effaying is used in metallurgical operations to signify the method of determining how much gold or silver is contained in any mass of metal already melted from its ore.

1. Effay of the Value of Silver, to examine its purity, or the quantity of alloy mixed with it. The common method of examining the purity of silver, is by mixing it with a quantity of lead proportionable to the quantity of imperfect metals with which it is foppoted to be alloyed; by testing this mixture; and afterwards by weighing the remaining button of silver. The loss of weight which the silver suffers by cupellation shows the quantity of imperfect metals which it contained.

We may hence perceive, that the effay of silver is nothing else than the refining of it by cupellation. The only difference between these two operations is, that when silver is tested merely for the purpose of refining it, its value is generally known; and it is therefore mixed with the due proportion of lead, and tested, without any necessity of attending to the loss of weight it sustains during the operation; whereas, in the effay, all possible methods ought to be employed to ascertain precisely this loss of weight. The first of these operations, on the mere refining of silver, is made in the great, in the smelting of silver ores, and in small numbers and for making money *. The second operation is never made but in small, because the expenses of small operations are less than of great, and in the requisite accuracy is more easily attended to. The last operation is our present object, and is to be performed in the following manner.

We suppose, first, that the mass or ingot of silver of which an effay is to be made, consists of 12 parts perfectly equal; and these 12 parts are called pennyweights. Thus, if the ingot of silver be an ounce weight, each of these 12 parts will be $\frac{1}{12}$ of an ounce; or if it be a mark, each of these will be $\frac{1}{120}$ of a mark, &c. Hence, if the mass of silver be free from effaying, all alloy, it is called silver of 12 pennyweights; if it contains $\frac{1}{8}$ of its weight of alloy, it is called silver of 11 pennyweights; if $\frac{1}{16}$ of its weight is alloy, it is called silver of 10 pennyweights; and these 10 pennyweights or parts of pure silver are called fine pennyweights.

We ought to observe here concerning these pennyweights, that effayers give also the name penny-weight to a weight equal to 24 real grams; which latter real penny-weight must not be confounded with the former, which is only ideal and proportional; and such a confusion is the more likely to take place, as this ideal penny-weight is also, like the former, divided into 24 ideal grains, which are called fine grains.

An ingot of fine silver, or silver of 12 pennyweights, contains then 288 fine grains; if this ingot contains $\frac{1}{8}$ part of alloy, it is said to be silver of 11 pennyweights and 23 grains; if it contains $\frac{1}{16}$ of alloy, it is called silver of 11 pennyweights and 22 grains; if it contains $\frac{1}{32}$ of alloy, it is called silver of 11 pennyweights and 21 grains; and so on. Lastly, the fine grain has also its fractions, as $\frac{1}{10}$ of a grain, &c.

As effays to discover the value of silver are always made in small, effayers only take a small portion of an ingot for the trial; and the custom in France is to take 36 real grains for this purpose, which is consequently the largest weight they employ, and represents 12 fine pennyweights. This weight is subdivided into a sufficient number of other smaller weights, which also represents fractions of fine pennyweights and grains. Thus 18 real grains, which is half of the quantity employed, represents 6 fine pennyweights; three real grains represent one fine penny-weight, or 24 fine grains; a real grain and a half represent 12 fine grains; and a real part of a real grain represents $\frac{1}{12}$ of a fine grain, which is only $\frac{1}{12}$ of a mass of 12 pennyweights.

We may easily perceive, that weights so small, and effay-balances, ought to be exceedingly accurate. These balances are very small, suspended and inclosed in a box the sides of which are panes of glass, that they may be preferred from dust, and that their motion may not be affected by agitated air, so as to disorder their action *.

When an effay of a mass or ingot of silver is to be made, the custom is to make a double effay. For this purpose, two fictitious semi-marks, each of which may be equal to 36 real grains, are to be cut from the ingot. These two portions of silver ought to be weighed very exactly; and they ought also to have been taken from opposite sides of the ingot.

Perions accustomed to these operations know pretty nearly the value of silver merely by the look of the ingot, and still better by rubbing it on a touchstone. By the judgment they form of the purity of the ingot, they regulate the quantity of lead which is to be added to it, as this quantity must be always proportional to the quantity of imperfect metal mixed with the silver.

Nevertheless, this proportion of lead to the alloy has not been precisely determined. Authors who treat of this subject differ much. They who direct the largest quantity of lead, say, that thereby the alloy is more certainly destroyed; and others who direct a small quantity of lead, pretend, that no more of that metal ought...
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The experiments made by those chemists, and the consequent regulation, have determined that four parts
of lead are requisite for one part of silver of 11 penny-weight and 12 grains, that six parts of lead are re- 
quisite for silver of 11 penny-weight, eight parts of lead for silver of 10 penny-weight, 10 parts of lead for sil-
ver of nine penny-weight, and to on in the same proportion.

The custom is to use cups of such a size that their weight shall be equal to that of one half of the lead employed in the effay; because such cups have been found capable of imbibing all the litharge formed during the operation. These cups are to be placed together under a muffle in an effay-furnace. The fire is to be kindled, and the cups are to be made red-hot, and to be kept so during half an hour at least before any metal be put into them. This precaution is necessary to dry and calcine them perfectly; because if they contained any moisture or inflammable matter, an ebullition and effervescence would be occasioned in the effay. When the cups are heated so as to become almost white, the lead is to be put into them; the fire is to be increased, which is done by opening the door of the ah-hole so as to admit air, till the lead becomes red, smoking, and is agitated by a motion of its parts called its circulation, and till its surface becomes smooth and clear.

Then the silver, previously heated into small plates for its easier fusion, is to be put into the cups; the fire is to be continued and even increased, by putting hot coals at the mouth of the muffle, till the silver have entered the lead, that is, till it have melted and mixed with the lead. When the melted matter circulates well, the heat is to be diminished by taking away partly or entirely the coals put at the mouth of the muffle, and by closing more or less the doors of the furnace.

The heat ought to be regulated so, that the effays in the cups shall have surfaces sensibly convex, and shall appear ardent, while the cups are yet red; that the smoke shall rise almost to the roof of the muffle; that undulations shall be made in all directions upon the surfaces of the effays, which are called circulations; that their middles shall be smooth, and surrounded with a small circle of litharge, which is continually imbied by the cups.

The effays are to be kept in this state till the operation is finished, that is, till the lead and alloy have soaked into the cupel; and the surfaces of the buttons of silver being no longer covered with a pellicle of litharge, becomes suddenly bright and flaming, and are then said to lighten. If the operation has been well conducted, the two effays ought to become bright nearly at the same time. When the silver has been by this operation well refined, we may see, immediately after it has brightened, the surface of the silver covered with a rainbow colours which quickly undulate and cross each other, and then the buttons become fixed or solid.

The management of the fire is an important article in effays. For if the heat be too great, the lead is
scorified and imbied by the cupel so quickly, that it has not sufficient time to scorify and carry along with it all the alloy; and if the heat be too little, the litharge is gathered upon the surface, and does not penetrate the cupel. The effayers say then, that the effay is shooked or drowned. In this case the effay does not advance; because the litharge covering the surface of the metal defends it from the contact of air, which is absolutely necessary for the calcination of metals.

We have above related the marks of a successful effay. The heat may be known to be too great, from the convexity of the surface of the melted metal; from a too strong circulation; from the too vivid appearance of the cupel, so that the colours given to it by the litharge cannot be distinguished; and, lastly, by the smoke rising up to the roof of the muffle, or not being at all visible from its being so ardent and red-hot as not to be discernible. In this case, the heat must be diminished by shutting the door of the ah-hole; some effayers, for this purpose, put round the cups small, oblong, cold pieces of baked clay, which they call infruments.

If, on the contrary, the melted metal has a surface not very spherical, relatively to its extent; if the cupel appear dark-coloured, and the smoke of the effay do only creep upon the surface; if the circulation be too weak, and the circes, which appears like bright drops, have but a dull motion, and be not soaked into the cupel; we may be assured that the heat is too weak; much more may we be assured of it when the metal fixes, as the effayers call it. In this case, the fire ought to be increased by opening the door of the ah-hole, and by placing large burning coals at the mouth of the muffle, or even by laying them across upon the cups.

As soon as the lead is put into the cups, the fire is to be increased, because they are then cooled by the cold metal; and the lead ought to be quickly melted, to prevent its calm from collecting upon its surface in too great quantity before it be formed into litharge; which it would do, and be difficulty fuscd, if the heat were too weak.

When the silver is added to the lead, the heat must be still increased; not only because the silver cools the mufs, but because it is less fusible than lead. And as all these effects ought to be produced as quickly as possible, more heat at length given than ought to be continued; and therefore when the silver has entered the lead, the heat is to be diminished till it becomes of a due intensity for the operation.

During the operation, the heat ought gradually to be augmented to the end of it, both because the metallic mixture becomes less fusible as the quantity of lead diminishes; and also because the lead is more difficultly fusible, as it is united with a larger proportion of silver. Hence the effays must be rendered very hot before they brighten.
When the operation is finished, the cupels are left in the same heat during some seconds, to give time to the last portions of litharge to be entirely absorbed; because, if any of it remained under the buttons of silver, it would stick to them. The fire is then allowed to extinguish, and the cupels to cool gradually, till the buttons have entirely fixed, particularly if they be pretty large; because, if they cool too quickly, their surfaces fix and contract before the internal masses, which is thereby so strongly compressed as to burst through the external solid coat and form vegetation, or even to be entirely detached from the rest of the mass, and dispersed. This is called the vegetation of the button. It ought to be carefully prevented, because small bits of silver are sometimes thrown out of the cupel.

Lastly, when the buttons are thoroughly fixed, they are to be difengaged from the cupels by a small iron utensil while they are yet hot; otherwise they could not be disengaged clean and free from part of the cupels, which strongly adhere to them when the heat is much diminifhed.

Nothing then remains to complete the essay, but to weigh the buttons. The diminution of weight which they have suffered by cupellation will show the purity or value of the ingot of silver.

We ought to observe, that as almost all lead naturally contains silver, and that after cupellation this silver is mixed with the silver of the ingot in the button of the essay, before we employ any lead in this operation, we ought to know how much silver it contains, that we may subtract this quantity from the weight of the button, when we compute the fineness of the silver of the ingot essayed. For this purpose, essayers generally cupel a certain quantity of their lead separately, and weigh accurately the button of silver it yields; or, at the same time when they essay silver, they put into a third cupel, in the muffle, a quantity of lead equal to that employed in both their essays; and when the operation is finished, and the buttons are to be weighed, they throw the small button produced from the lead alone into the scale which contains the weights; and as this exactly counterpoises the small portion of silver which the essay boxes have received from the lead employed in the cupellation, the weights will show precisely the quantity of silver contained in the ingot, and thus the trouble of calculating is prevented. The small button of silver procured from the cupellation of lead alone is called the witness. But to prevent this trouble, essayers generally employ lead which contains no silver, such as that from Willach in Carinthia, which is therefore procured by essayers.

In the second place, we shall observe, that a certain quantity of silver always passes in the cupel, as refiners in the great have long observed, and which happens also in essaying small quantities. The quantity of silver thus absorbed, varies according to the quantity of the lead employed, and the matter and form of the cupels; all which objects will undoubtedly be determined by the abovementioned chemists.

The cupellation which we have now described is exactly the same for essays by which the produce of a silver ore, or of an ore of another metal containing silver, is determined. But as there ores contain frequently, gold, and sometimes in considerable quantity, when these essays are made, the buttons of silver obtained by the essays ought to be subjected to the operation called paring. See Silver, Refining, &c.

M. Tillet has published a memoir, showing that essays of silver made in the common method are uncertain and not to be depended upon; and that this uncertainty proceeds from the different quantities of silver absorbed by the cupel in different essays, according as the heat and other circumstances happen to vary. He therefore proposes, in order to render essays accurate, to extract from the cupel the quantity of silver it has absorbed during the operation, and to add this particle of silver to the button, as these two contain the whole quantity of silver in the matter essayed.

The variations in the different results of different essays, or of the same essay at different times, upon the same mafs of silver, are sufficient proofs of the uncertainty mentioned by M. Tillet. These variations are occasioned, according to that author, principally from the following causes: 1. From the inaccuracy of the balances and weights employed. 2. From the faulty fusion of the mafs to be essayed; by which means the contained alloy may be unequally diffused. 3. From the impurity of the lead, especially from its containing silver, which is not always equally diffused through its mafs. 4. From the different proportions of lead used by different essayers. 5. From the difference of the intensity of heat; for if the heat be not sufficiently intense, the silver will still contain a portion of alloy; and if the heat be too intense, too much of the silver will be imbied by the cupel. 6. From the want of care in picking the small particles of the button, as some compensation for the weight of silver absoind by the cupel. And as it is a constant rule, that the more lead is used, the greater is the loss by the aborption of the cupel, he remarks, that a regulation, directing a larger proportion of lead for France than is used in other countries, would be disadvantageous to that kingdom; as thereby the silver of the same denomination would be required to be finer in that than in other countries where a lesser proportion of lead was employed. He observes that the above mentioned rule, “that the more lead is used, the greater is the loss by the aborption of the cupel,” does not extend to quantities of lead much above double the usual quantities. Thus 32 parts of lead to one of silver, will not occasion more aborption than 16 parts of lead.
ESS

Effay of Gold.

lead. For the refining scarcely takes place till the extraordinary quantity of lead be gone, and the silver is only or chiefly carried into the cupel along with the copper. Accordingly, he found, that he could render the silver finer by using four parts of lead at first, and afterwards adding two more parts when the irises began to appear, than by employing all the six parts of the lead at once. By this method of dividing the quantity of lead, the loss of silver by abscission was greater. M. Tillet did not find, that, by employing bifurcated charcoal with lead, his effays were more certain that when lead alone was used. He observed, however, than the addition of bifurcation made the silver purer, but occasioned a greater abscission by the cupel.

2. Effay of the Value of Gold. The fiduciary weights used to determine the purity of gold, and to essay this metal, are different from those of silver. See the preceding article. A mass of gold perfectly pure, or which contains no alloy is ideally divided into 24 parts, called carats; this pure gold is therefore called mass of 24 carats. If the mass or ingot contains 
\( \frac{1}{12} \)th part of its weight of alloy, the gold is then of 23 carats; and if it contains 
\( \frac{1}{12} \)th or 
\( \frac{1}{12} \)th of alloy, its gold is of 22 carats, &c. Hence we see, the real weight or carat of gold is only a relative and proportional weight, for the real weight of the carat varies according to the total weight of the mass of gold to be examined. If this mass of gold weighs a mark, the real weight of the carat will be 
\( \frac{1}{12} \) of eight ounces, which is equal to a mark. If the mass weight an ounce, the carat will be 
\( \frac{1}{12} \)th part of an ounce, or 24 grains. If it is only a penny-weight or 24 grains, the real weight of a carat will be one grain; and so on.

The greater accuracy, the carat of gold is divided into 32 parts, which are relative and proportional weights, as the carat itself is. Thus 
\( \frac{1}{32} \)th of a carat of gold is 
\( \frac{1}{32} \)d of 
\( \frac{1}{32} \)th, or the 
\( \frac{1}{32} \)th or any mass of gold: and the gold which contains an alloy equal to the 
\( \frac{1}{12} \)th part of the whole mass is called mass of 23 carats, and 
\( \frac{1}{12} \)th of 
\( \frac{1}{12} \)th of any mass of gold: and the gold which contains 
\( \frac{1}{12} \)th of alloy is mass of 23 carats and 
\( \frac{1}{12} \)th; and so on.

The real weight now generally used in the operation for determining the purity of gold is six grains. This weight then represents 24 carats. The half of this weight, or three real grains, represents 12 carats. According to this proportion, we will find that 
\( \frac{1}{12} \)th of a real carat represents one carat, and the 
\( \frac{1}{12} \)th part of a grain represents the 
\( \frac{1}{12} \)d of a carat, or the 
\( \frac{1}{12} \)th part of a mass of gold to be essayed.

As these weights are exceedingly small, some essayers employ a weight of 12 grains, which must be very convenient.

When a mass or ingot of gold is to be essayed, six grains are to be cut off, and exactly weighed; also 18 grains of fine silver are to be weighed. These two metals are to be cupelled together with about ten times as much lead as the weight of the gold. This cupellation is conducted precisely like that of the essay to determine the purity of the silver, excepting that the heat must be raised a little more towards the end of the operation when the essay is going to brilliant. Then the gold is freed from all alloy but silver. If the quantity of copper that other alloy deniable by cupellation is required to be known, the remaining button is accurately weighed. The diminution of weight from the sum of the weights of the gold and of the silver determines the quantity of this alloy.

The button containing gold and silver is then to be flattened upon a polished piece of steel, and care must be taken to anneal it from time to time, to prevent its splitting and cracking. By this method it is reduced to a thin plate, which is to be rolled up, in order to be parted by aquafortis. The diminution found after the parring from the original weight of the gold effing, shows the whole quantity of alloy contained in that gold.

The essay for determining the purity of gold is then made by two operations: the first, which is cupellation, deprives it of all its imperfect metals; and the second, which is parting, separates all the silver from it. By antimony also gold may be purified, which is a kind of dry parting. By this single operation, all the imperfect metals, and silver with which gold is alloyed, are separated. See Purification, Gold, Silver, Refining.

Essay-flax, is theminer's term for a little trench or hole, which they dig to search for lead or ore.

ESSEDARI, a post of gladiators, mentioned by Sera, Sestonius, and Tully, who on some occasions engaged one another out of chariots called effida. The effidad was a post of heavy chariot from which the Gauls and Britons engaged the Romans. See Gladiators.

ESSENCE, in metaphysics, that which constitutes the particular nature of each genus or kind, and distinguishes it from all others: being nothing but that abstract idea to which this name is affixed, so that every thing contained in it is essential to that particular kind.

This Mr Locke calls the nominal essence; in contradistinction to the real essence, or constitution of substances on which this nominal essence depends. Thus the nominal essence of gold is that complex idea the word gold stands for; let it be for instance, a body, yellow, weighty, malleable, fusible, and fixed: but its real essence is the constitution of its inextricable parts, on which these qualities and all its other properties depend, which is wholly unknown to us.

ESSENES, or SESENIANS, in Jewish antiquity, one of the three ancient sects among that people. They allowed their future state, but denied a resurrection from the dead. Their way of life was very singular: they did not marry; but adopted the children of others, whom they bred up in the institutions of their sect: they deified riches, and had all things in common, and never changed their clothes till they were entirely worn out. When initiated, they were strictly bound not to communicate the mysteries of their sect to others; and if any of their members were found guilty of enormous crimes, they were expelled.

Pliny tells us, that they dwelt on the west side of the lake Asphaltites; and that they were a solitary kind of men, living without women or money, and feeding upon the fruit of the palm-tree: he adds, that they were constantly recruited by new comers, whom the surges of ill fortune had made weary of the world: in which manner the sect was kept up for several thousands of years, without any thing born among them. The reason why we find no mention made of them in the New Testament, may be their recluse and retired way of life, not less than their great simplicity of...
ESTOPPEL (formed of the French esiquer, oppi­
are, ofipare, “to stop, or block up”), in law, an
impediment or bar of action, arising from a man's
own act or deed; against which a man is forbidden,
by law, to speak, though it be to say the truth.

ESTOvers, in law, is used, by Bracton, for that
suffrance which a man, committed for felony, is
to have out of his lands or goods for himself and his
family during imprisonment. In Stat. 6 Edw. 1, it is,
used for an allowance in meat or clothes. In some
manors, the tenants have common of Estovers; that is,
necessary botes or allowances out of the lord's
wood; In which laft fene, estowers comprehends houfe-bote,
hay-bote, and plow-bote; so that if a man have
in his grant thefe general words, de rationabilis estoversi in
boves, &c. he may thereby claim all three.

Estovers is also used for alimony, which, if the
husband refuseth to pay, there is, besides the ordinary
proceeds of excommunication, a writ at common law, de
estoversis honoribus, in order to recover.

ESTRAY, or STRAY, signifies any tame beast, as
sheep, oxen, swine, and horses, or swans, found within
a lordship, and not owned by any man; in which
café
cafe being cried, according to law, in the church, and two market towns adjoining, if it be not claimed by the owner within a year and a day, it becomes the lord of the fol where found. If the owner claims it within the year and day, he must pay the charges of finding, keeping, and proclaiming them; and he may seize it, without telling the marks or proving his property, which may be done at the trial if contested. If the bailiff seizes it within the year to another lordship, the first lord cannot retake it. An esfray must be fed and kept, uninjured, and without labour till it is reclaimed or the limited time expires.

ESTRETEAT, EXTRACTUM, in law, is used for the true copy or duplicate of some original writing, especially of amercements or penalties set down in the rolls of a court, to be levied by the bailiff or other officer, on every offender.

ESTREMADURA, a province of Spain, has New-Caflle on the eait, Leon on the north, Andalufia on the south, and Portugal on the west. It is 175 miles in length, and 100 in breadth; and its principal towns are, Caluruva, Mena, and Badajoz, on the river Guadiana; Alcantara, on the Tajo; and Cruna and Placentia, to the north of this river.

This province enjoys a very pure and healthful air, and its mountains are full of wild and tame animals; they having woods and forests for the one fort, and pastures for the other. The lands are planted with fruit-trees, which bear all kinds of delicious fruit. The vineyards produce excellent wines of all colours, and the fields yield plenty of corn.

ESTREMADURA, a province of Portugal, near the mouth of the Tagus or Tajo, bounded on the north by Beira, on the eait and south by Alentejo, and on the west by the Atlantic Ocean. It is about 88 miles in length, and 45 in breadth. This province is divided into fix comarcas, viz. Litria, Lisbon, Tomar, Santarem, and Alanquar, to the north of the Tagus; and that of Setubal, to the south of this river. These are likewise the principal towns. Estremadura is equal, if not preferable, to any other province in Spain or Portugal. The district of Santarem produces such plenty of corn, and feeds so many flocks of sheep, that it may enter into competition with Sicily. The fruits and the wines are all excellent; and it was here that the sweet oranges brought from China were first planted, and of which there are large quantities transported to foreign parts, with the wines and other fruits. The lands are covered with flowers almost all the year, from which the bee collects large quantities of fine honey. The olive trees are numerous, from which they have excellent oil. The rivers abound with good fish, and the mountains have quarries of several kinds.

ETCHING, a method of engraving on copper, in which the lines or strokes, instead of being cut with a tool or graver, are eaten in with aquafortis. See Engraving.

Etching is of a latter invention, though not very modern, than engraving with the tool; of which it was at first only an imitation, that was practised by painters and other artists, who could much sooner form their hands to, and attain a faculty of, working in this way, than with the graver. But being then nevertheless considered as a counterfeit kind of engraving, and therefore inferior to the other, it was cultivated in a very confined manner; the cloisters of the resemblance of the work to that performed by the tool, being made the test of its merit, and consequent-ly the principal object of aim in those who pursued it. The servile confinement of the art of etching to the imitation of the original kind of engraving, was a great cause of retarding its advancement towards perfection, as many of the most able masters cramped their talents with the obserbance of it; which may be seen in the instances of Sadeler, Swaneberg, Villena, and particularly, Le Boe: who, in his treatise on engraving, has laid down as a principle, that the perfection of this kind consists in the close similitude of the work with that done by the tool. This absurd prepossession has been since worn out; and the method of working with aquafortis has been so far improved, that instead of being now deemed a spurious kind of engraving, it evidently appears the foundation of an excellence in many modern works, that could never have been produced without it; since, through the neatness and uniformity of the hatches, which attend the use of the tool, is more advantageous with respect to portraits; yet the liberty and facility of the other manner give a much greater opportunity to exercise the force of genius and fancy in history-engraving; where the effect of the whole, and not the minute exactness in finishing all the parts, constitutes the principal value.

There are two methods practised of engraving in this way; the one with a hard varnish or ground, the other with a soft. The first was formerly much used, being better accommodated to the intention of imitating the engraving with the tool; as the firmness of the body of the varnish gave more opportunity of touching the lines, or enlarging them with the oval-pointed needles, called by the French échappes, as was practised by Le Bofe and others for that purpose. The latter has now almost wholly superseded the use of the other; by the free manner of working it admits of; which affords a power of expression incompatible with the greater inflexibility of the hard varnish, that confines the lines and hatches to such a regularity and sameness, as gives a stiffness of mixture and coldness of effect to the work.

The mixture of the use of the tool and aquafortis, which are now both employed in many cases, has, however, given that perfection to engraving which it possessed at present. The truth and spirit of the outline—the clearness of the design—beauty of the tools, and the variety of shades which the different kinds of black produce in this way, as well as other means of expressing the peculiar appearance and character of particular subjects, furnish what was defective in the sole use of the tool; while, on the other hand, the exactness and regularity of the lines, which are required for finishing many kinds of designs, are supplied by the graver; and by a judicious application of both, that complete finishing is obtained, which either of them alone must necessarily want.

The manner by which this art is performed, is the covering the surface of the plate with a proper varnish or ground, as it is called, which is capable of receiving aquafortis; and then scoring or scratching away, by instruments resembling needles, the parts of this varnish or ground, in the places where the strokes or hatches of the engraving are intended to be; then, the plate being covered with aquafortis, the parts
that are laid naked and exposed by removing the ground or varnish, are corroded or eaten away by it, while the rest, being secured and defended, remain un

There are two methods of etching, as hath been already observed; the difference of which from each other consists, as well in the difference of the varnish or ground, as in that of the aquafortis, adapted to each kind: but the general methods of performing them are alike in both. These varnishes or grounds are distinguished by the names of hard and soft: for in their consti

Preparation of the soft varnish: according to Mr. Lawrence, an eminent English engraver at Paris. "Take of virgin wax and asphaltum, each two ounces; of black pitch and Burgundy pitch, each half an ounce. Melt the wax and pitch in a new earthen-ware glazed pot; and add to them, by degrees, the asphaltum finely powdered. Let the whole boil till such time as that, taking a drop upon a plate, it will break when it is cold, on bending it double or three times between the fingers. The varnish being then enough boiled, must be taken off the fire; and letting it cool a little, must be poured into warm water, that it may work the more easily with the hands, so as to be formed into balls, which must be rolled up, and put into a piece of taffety for use."

It must be observed, first, that the fire be not too violent, for fear of burning the ingredients; a slight simmering will be sufficient; secondly, that while the asphaltum is putting in, and even after it is mixed with them, the ingredients should be stirred continually with the spatula; and thirdly, that the water, into which this composition is thrown, should be nearly of the same degree of warmth with it, to prevent a kind of cracking that happens when the water is too

The varnish ought always to be harder in summer than in winter; and it will become so if it be suffered to boil longer, or if a greater proportion of the asphaltum or brown rein be used. The experiment above-mentioned, of the drop suffered to cool, will determine the degree of hardness of softness that may be suitable to the season when it is used.

Preparation of the hard varnish used by Callot, commonly called the Florence varnish. Take four ounces of fat oil very clear, and made of good linseed oil, like that used by painters: heat it in a clean pot of glazed earthen ware, and afterwards put to it four ounces of mastich well powdered; and stir the mixture briskly till the whole be well melted; then pass the whole mass through a piece of fine linen into a glass bottle with a long neck, that can be stopped very securely: and keep it for the use that will be below explained.

Method of applying the soft varnish to the plate, and of blackening it. The plate being well polished and burnished, as also cleaned from all greasiness by chalk or Spanish white, fix a hand-vise on the edge of the plate where no work is intended to be, to serve as a handle for managing it when warm: then put it upon a chafing-dish, in which there is a moderate fire; observing to hold it so that it may not burn: keep the plate over the fire till it be so hot that the varnish being brought into contact with it may melt: then cover the whole plate equally with a thin coat of the varnish; and while the plate is warm, and the varnish upon it in a fluid state, heat every part of the varnish gently with a small ball or dauber made of cotton tied up in taffety; which operation smooths and distributes the varnish equally over the plate.

When the plate is thus uniformly and thinly covered with the varnish, it must be blackened by a piece of flambeau, or of a large candle which affords a copious smoke; sometimes two, or even four, such candles are used together for the sake of dispatch, that the varnish may not grow cold; which if it does during the operation, the plate must then be heated again, that it may be in a melted state when that operation is performed: but great care must be taken not to burn it: which, when it happens, may be easily perceived by the varnish appearing burnt and loosing its glosis. The following expedient is made use of for the more commodiously blackening the varnish, being particularly necessary where the plates are large: fix a strong hook in the roof of the room, through which pass four pieces of cord of equal length, at the end of which are fixed four iron rings of about four inches diameter, for supporting the corners of the plate. The plate being thus suspended in the air, with the varnished side downwards, may be blackened with great convenience: but this is not, however, absolutely requisite, except in the case of large plates that could not, without difficulty, be held up, unless this or some other such contrivance were made use of.

It is proper to be very cautious in keeping the flambeau or candle at a due distance from the plate, lest the wick touch the varnish, which would both fully and mark it. If it appear that the smoke has not penetrated the varnish, the plate must be again placed for some little time over the chafing-dish; and it will be found, that, in proportion as the plate grows hot, the varnish will melt and incorporate with the black which lay above it, in such a manner that the whole will be equally pervaded by it.

Above all things, the greatest caution should be used in this operation, to keep all the time a moderate fire; and to move frequently the plate, and change the place of all the parts of it, that the varnish may be alike melted every where, and kept from burning. Care must also be taken, that during this time, and even till the varnish be entirely cold, no flith, sparks, or dust, fly on it; for they would then stick fast, and spoil the work.

Method of applying the hard varnish. This is precisely the
ETEOCLES, by right of feniority fetching the same, he, in the manner; needle. If any scratches or false feather, and brushing away the black saline matter ing the points. The plate being thus prepared, and an exact drawing of the outlines of the design made upon thin paper, the other side of the paper must be well rubbed with chalk or Spanish whitening, or, which is better, with red chalk scraped to a powder; and the loose chalk is cleared off with a linen rag: then the stained side of the paper is laid upon the varnish, fixing the corners to the plate with wax or wafers, to prevent its shifting; and with a blunt needle or pointer the drawing is slightly traced, and communicates to the varnish an exact outline of the design to be etched.

A variety of pointers is necessary for the work. Those used for the broad large strokes ought to be very blunt, excelling round, and softly polished at the point; the sole of a shoe answers very well for polishing the points. The finest ought to be as sharp as a needle. If any scratches or false strokes happen in the working, they are to be stopped up with a hair-pencil dipped in Venetian varnish, mixed with lamp-black, by which means these places will be defended from the action of the aquafortis.

The next operation is that of eating or corroding the plate with aquafortis; in order to which, a border of soft wax (being a composition of bees-wax melted and tempered with a little Venice turpentine and tal- low) must be fastened round the plate about an inch high, in the form of a little wall or rampart, to contain both the whitening, or, when it appears to flatter, the royalty, and reign alternately each a year. Eteocles by right of seniриority first ascended the throne; but after the first year of his reign was expired he refused to give up the crown to his brother, according to their mutual agreement. Polyneices resolved to punish such an open violation of a solemn engagement, went to im- prove the assistance of Adrætus king of Argos. He received that king's aid, and was soon after assisted with a strong army headed by seven famous generals. These hostile preparations were seen by Eteocles, who on his part did not remain inactive. He chose seven brave chiefs to oppose the seven leaders of the Argives, and stationed them at the seven gates of the city. He placed himself against his brother Polyneices, and he opposed Menalippeus to Tydeus, Polyphonies to Caphaneus, Megareus to Eteocles, Hyperbius to Parthenopaeus, and Lathonnes to Amphiarais. Much blood was shed in light and unwavering skirmishes, and it was at last agreed between the two brothers that the war should be decided by single combat. They both fell in the engagement conducted with the most inveterate fury on either side; and it was even said that the affes of these two brothers, who had been so inimical one to the other, separated themselves on the burning pile, as if sensible of repentment, and hostile to reconciliation.

ETERNITY, an attribute of God, expressing his infinite or endless duration. See Logic and Metaphysics.

ETERNITY, in mythology, a divinity among the Romans, who had neither temples nor altars. They represented it under the figure of a woman, who held the sun in one hand and the moon in the other: her symbols were a phoenix, globe, and elephant.

ETEISÆ, or ETEISAN winds, are such as blow at stated times of the year, from what part soever of the compass they come. They are so called from the Greek word ἔτειος, "year," being yearly or anniversary winds, such as our seamen call monfoons or trade-winds, which in some parts of the world continue constantly blowing for certain stated feasons of the year. Thus, the north winds, which, during the dog-days, constantly blow upon the coasts of Egypt, and hinder all ships from sailing out of Alexandria for that season, are called eteisæ in Caesar's Commentaries. In other authors, the west and east winds are called eteisæ, when they continue blowing for certain seasons of the year.

Cellarius endeavours to prove that these winds are properly etesian which blow from that part of the horizon which is between the north and west about the time of the solstice. In ancient writers, they are repre- sented as of a very mild and gentle nature; and were called
ETHELWALD, a celebrated, though very much unknown empire of Africa, whose boundaries have never been exactly defined either by ancient or modern geographers. By some writers of antiquity the title of Ethiopians was given to all nations whose complexion was black: hence we find the Arabsians as well as many other Asiatics sometimes falling under this denomination; besides a number of Africans whose country lay at a distance from Ethiopia properly so called. Thus the Africans in general were by their writers divided into the western or Hesperian Ethiopians, and those above Egypt situated to the east of the former; the latter being much more generally known than the former, by reason of the commerce they carried on with the Egyptians.

From this account we may easily understand why there should be such a seeming disagreement among ancient authors concerning the situation of the empire of Ethiopia, and likewise why it should pass under such a variety of names. Sometimes, for example, it was named India, and the inhabitants Indians; an appellation likewise applied to many other distant nations. It was also distinguished by the names of the remote periods of antiquity, Ethiopia, or Ethiopia by certain writers; and all the countries extending along the coast of the Red Sea were promiscuously denominated India and Ethiopia. By the Jews the empire of Ethiopia was styled Caphth and Ludim.

Notwithstanding this diversity of appellations, and vast diffusion of territory ascribed to the Ethiopians, there was one country to which the title was thought more properly to belong than to any of the rest; and which was therefore called Ethiopia Propria. This was bounded on the north by Egypt, extending all the way to the lesser cataract of the Nile, and an island named Elephantine; on the west it had Lybia Interior; on the east the Red Sea, and on the north the unknown parts of Africa; though these boundaries cannot be fixed with any kind of precision.

In this country the ancients distinguished a great variety of different nations, to whom they gave names either from some particular peculiarity of their manners of living. The principal of these were, 1. The Blemyes, seated near the borders of Egypt; and who, probably from the shortness of their necks, were said to have no heads, but eyes, mouth, &c. in their breasts. Their form, somehow or other, must have been very extraordinary, as we learn from Vopiscus, who gives an account of some of the captives of this nation brought to Rome. 2. The Nubians, inhabiting the banks of the Nile near the island Elephantine already mentioned, said to have been removed thither by Osiris to repress the incursions of the Blemyes. 3. The Troglodytes, by some writers said to belong to Egypt, and described as little superior to brutes. 4. The Wulians, of whom little more is known than their name. 5. The Pigmies, by some supposed to be a tribe of Troglodytes; but by the most approved writers placed on the African coast of the Red Sea. 6. The Acalites or Abalites, of which we know nothing more than they were situated near the Abalitic gulf. 7. The Struthophagi, so called from their feeding upon ostriches, were situated to the south of the Memnones. 8. The Acri-
A number of authors are of opinion, that Ethiopia originally received its name from the food they made use of, viz. locusts, tortoises, fift, butches milk, elephants; roots, fucruts, or Geels, and serpents. 17. The Hygeuotes, neighbors to the Elephantophagi, and who were so savage that they had no houses, nor any other places to sleep in but the tops of trees. 8. The Panaphagi, who used almost every thing indiscriminately for food. 19. The Atriophagi, who lived on the flesh of wild beasts. 20. The Anthropophagi, or man-eaters, are now supposed to have been the Caffres, and not any inhabitants of Proper Ethiopia. 21. The Hippophagi, or horse-eaters, who lay to the northward of Lybia Incognita. 22. The Macrobii, a powerful nation, remarkable for their longevity; some of them attaining the age of 120 years. 23. The Sambri, situated near the city of Tavulnis in Nubia upon the Nile; of whom it is reported that all the quadrupeds they had, not excepting even the elephants, were deffitate of ears. 24. The Astabe, a people inhabiting the mountainous parts, and continually employed in hunting elephants. Besides these, there were a number of other nations or tribes, of whom we scarce know any thing but the names; as the Gasachi, Poeemphanes, Catafuli, Pechini, Cata­drae, &c.

5 Of the first Ethio­pia. In a country inhabited by such a variety of nations, all in a state of extreme barbarism, it is rather to be wondered that we have any history at all, than that it is not more difficult. It has already been observed, that the Jews, from the authority of the sacred writers no doubt, bestowed the name of Cush upon the empire of Ethiopia; and it is generally agreed that Cush was the great progenitor of the inhabitants. In some passages of scripture, however, it would seem that Cush was an appellation bestowed upon the whole peninsula of Arabia, or at least the greatest part of it. In others, the word seems to denominate the country watered by the Araxes, the seat of the ancient Scythians or Cuffites; and sometimes the country adjacent to Egypt on the coast of the Red Sea. A number of authors are of opinion, that Ethiopia received its first inhabitants from the country lying to the east of the Red Sea. According to them, the descendents of Cush, having settled in Arabia, gradually migrated to the south-eastern extremity of that country; whence, by an easy passage across the straits of Babelmandel, they transported themselves to the African fide, and entered the country properly called Ethiopia: a migration which, according to Eusebius, took place during the refidence of the Israelites in Egypt; but, in the opinion of Syncellus, after they had taken possession of Canaan, and were governed by judges.

6 People originally from Ar­ba. Mr Bruce makes mention of a tradition among the Abyssinians, which, they say, has existed among them from time immemorial, that very soon after the flood, Cush the grandfon of Noah, with his family, passed through Athbara, then without inhabitants, till they came to the ridge of mountains which separates that country from the high lands of Abyssinia. Here, stiff terrified with the thoughts of the deluge, and apprehensive of a return of the same calamity, they chose to dwell in caves made in the fides of those mountains, rather than truft themselves in the plains of Ab­bara; and our author is of opinion, that the tropical rains, which they could not fail to meet with in their journey southward, and which would appear like the return of the deluge, might induce them to take up their habitations in those high places. Be this as it may, it is certain that the Cushites, who unceasingly visited these parts, were a number of other nations or tribes, of whom we learn nothing more than their names, till we come to the Cuffites, who unparalled industry, and with instruments utterly unknown to us, formed to themselves commodious, yet wonderful, habitations in the heart of mountains of granite and marble, which remain entire in great numbers to this day, and promise to do still the consummation of all things.

7 Abyssinian tradition con­cerning it. The Cushites having once established themselves amongst these mountains, continued to form habitations of the like kind in all the neighboring ones; and thus following the different chains (for they never chose to descend into the low country), spread the arts and sciences, which they cultivated quite across the African continent from the eastern to the western ocean. According to the tradition abovementioned, they built the city of Axum early in the days of Abraham. This, though now an inconsiderable village, was anciently noted for its superb structures, of which some remains are still visible. Among these are some belonging to a magnificent temple, originally 110 feet in length, and having two wings on each side; a double porch, and an aicent of 12 steps. Behind this stand several obelisks of different fizes, with the remains of several others which have been destroyed by the Turks. There is also a great square stone with an inscription, but so much defaced that nothing can be discovered excepting some Greek and Latin letters, and the word Bathus. Mr Bruce mentions some "prodigious fragments of colossal statues of the dog-star" still to be seen at this place; and Seir (adds he), which, in the language of the Troglodytes, and in that of the low country of Meroe, exactly corresponding to it, signifies a dog, instructs us in the reason why this province was called Sirè, and the large river which bounds it Siris.

8 After building the city of Axum, the Cushites founded that of Meroe, the capital of a large island or peninsula formed by the Nile, much mentioned by ancient historians, and where, according to Herodotus, they pursued the study of astronomy in very early ages with great success. Mr Bruce gives two reasons for their Merowish building this city in the low country after having built Axum in the mountainous part of Abyssinia. 1. They had discovered some inconveniences in their caves both in Sirè and the country below it, arising from the tropical rains in which they were now involved, and which prevented them from making the celestial observations to which they were so much addicted. 2. It is probable that they built this city farther from the mountains than they could have wished, in order to avoid the fly with which the southern parts were infected. This animal, according to Mr Bruce, who has given a description of a figure of it, is the most troublesome to quadrupeds of a pestilential fly, that can be imagined. He informs us, that it hides its lental fly, and is not infested by any other natural lift. It is of a fize somewhat larger than a bee, thicker in proportion, and having broader wings, placed pare in shins of a fly, and quite colourless, or without any spot. The head
infrance, caveted Ethiopia.

Of Indians and mine. The elephant and rhinoceros, who, on account of the quantity of food they require, cannot be confined to the barren places, roll themselves in the mud, which, riched by the Atbara, where they when dry, coats them over so hard, that they are enabled to resist the punctures of the insect; though even on these some tubercles are generally to be met with, which our author attributes to this cause. Mr Bruce is of opinion that this is the fly mentioned by Isaiah, chap. vii. 18, 19. "And it shall come to pass, in that day, that the Lord shall hey for the fly that is in the uttermost part of the rivers of Egypt; and they shall come and shall reit all of them in the delightful valleys and in the holes of the rocks, and upon all thorns, and upon all briers." That is (says Mr Bruce), they shall cut off from the cattle their usual retreat to the desert, by taking possession of these places, and meeting there, where ordinarily they never come, and which therefore are the refuge of the cattle.

Meroc, which lay in N. Lat. 16°, the exact limit of the tropical rains, was without the bounds assigned by nature to these destructive insects; and consequently a place of refuge for the cattle. Mr Bruce, on his return through the desert, saw at Gerri, in this latitude, rains supplied to be those of Meroc, and caves in the mountains immediately above them; for he is of opinion, that they did not abandon their caverns immediately after they began to build cities. As a proof of this, he mentions that Thebes, in Upper Egypt, was built by a colony of Ethiopians; and that near the ruins of that city, a vast number of caves are to be seen even up to the top of a mountain in the neighbourhood: all of which are inhabited at this day. By degrees, however, they began to exchange these subterranean habitations for the cities they built above ground; and thus became farmers, artificers, &c., though originally their sole employment had been commerce.

On this subject Mr Bruce has given a very curious dissertation; though how far the application of it to the Ethiopians may be just, we cannot pretend to determine. He begins with observing, that the magnificence of the Indians and Egyptians has been celebrated from the most remote antiquity, without any account of the sources from whence all this wealth was derived; and indeed it must be owned, that in all histories of these people, there is a strange deficiency in this respect. The kings, we are to suppose, derived their splendor and magnificence from their subjects; but we are quite at a loss to know whence their subjects had it; and this seems the more strange, that in no period of their history are they ever represented in a poor or mean situation. Nor is this difficulty confined to these nations alone. Palestine, a country producing neither silver nor gold, is represented by the facetious writers as abounding in the early ages with both these metals in a much greater proportion than the most powerful European states can boast of notwithstanding the vast supplies they derive from the lately discovered continent of America. The Aryan empire, at the time of Semiramis, was so noted for its wealth, that N. Montesquieu supposes it to have been obtained by the conquest of some more ancient and richer nation; the spoils of which enriched the Assyrians, as those of the latter afterwards did the Medes. This, however, Mr. Bruce very justly observes, will not remove the difficulty, because we are equally at a loss to know whence the wealth was derived to that former nation; and it is very unusual to find an empire or kingdom of any extent enriched by conquest. The kingdom of Macedon, for instance, though Alexander the Great over-ran and plundered in a very short time the richest empire in the world, could never vie with the wealth of Tyre and Sidon. These last were commercial cities and our author justly considers commerce as the only source from whence the wealth of a large kingdom ever was or could be derived. The riches of Semiramis, therefore, were accumulated by the East India trade centering for some time in her capital. While this was suffered to remain undisturbed, the empire flourished; but by an abford expedition against India itself, in order to the miftres at once of all the wealth it contained, the loot which she really possessed; and her empire was soon after entirely ruined. To the same source he attributes the riches of the ancient Egyptians; and is of opinion, that Setostris opened up to Egypt the commerce with India by sea; though other authors speak of that monarch in very different terms. As the luxuries of India have since or other become the objects of desire to every nation in the world, this hastily accounts for the wealth for which Egypt has in all ages been so much celebrated, as well as for those which other countries abounded; while they served as a medium for transmitting these luxuries to other nations, and especially for the riches of those which naturally produced the Indian commodities so much sought after. This was the case particularly with Arabia, some of the productions of which were very much coveted by the western nations; and being, besides, the medium of communication between the East Indies and western nations, it is easy to see why the Arabian merchants soon became possessed of immense wealth.

Besides the territories already mentioned, the Cufites had extended themselves along the mountains, which run parallel to the Red Sea on the African side of which country, according to Mr Bruce, has "in all times been called Sabo or Arab, both which signify South," an epithet given from its lying to the southward of the Arabian gulf, and which in ancient times was one of the richest and most important countries in the world. "By that acquisition (says our author), they enjoyed all the perfumes and aromatics in the caff, myrrh, and frankincense, and cattis; all which grow.
The Ethiopians, for some time after their settlement, according to Mr Bruce, must have been a nation of the first importance in the world. The northern colonies from Meroe to Thebes built cities, and made improvements in architecture, commerce, agriculture, and the arts; not forgetting the science of astronomy, for which they had an excellent opportunity by reason of the clearness of the sky in the Thebaid. Their brethren farther to the south, or those who inhabited Ethiopia properly so called, were confined for six months to their caves by reason of the tropical rains, whence they were naturally led to pursuits of another kind. "Letters", at least one kind of them, and arithmetical characters (we are told), were invented by this middle part of the Ethiopians; while trade and astronomy, the natural history of the winds and seasons, were what necessarily employed that part of the colony established at Sofala most to the southward.

While the Cushites were thus employed at home in collecting gold, gathering and preparing spices, &c., these commodities were sent abroad into other countries by another set of people named Shepherds, who acted as carriers to them, and who afterwards proved so formidable to the Egyptians. These differed in their appearance from the Ethiopians, having long hair and the features of Europeans; and were of a very dark complexion, though not at all like the Black-moors or negroes. They lived in the plain country in huts or moveable habitations, attending their cattle, and wandering up and down as various circumstances required. By acting as carriers to the Cushites, they became a great and powerful people, possessing vast numbers of cattle, as well as a very considerable extent of territory. They possessed a stripe of land along the Indian ocean; and to the northward of that, another along the Red Sea: but their principal habitation was the flat part of Africa between the northern tropic and the mountains of Abyssinia, which country is now called Beja. This reaches from Mafah along the sea-coast to Suakm; then turns westward, and continues in that direction, having the Nile on the south, the tropic of Cancer on the north, with the deserts of Selima and Libya on the west. The next district belonging to these people was Meroe, now called Athbara, lying between the rivers Nile and Atbara. A third district now called Derkin, is a small plain lying between the river Mareb on the east, and Athbara on the west. But the most noble and warlike of all the Shepherds were those who possessed the mountains of Habab, reaching from the neighbourhood of Mafah to Suakm; which district is still inhabited by them.

These Shepherds, according to our author, were different distinguished by several different appellations, which classes of may be supposed to denote different degrees of rank among them. Those called simply Shepherds, our author supposes to have been the common sort who attended the flocks. Another set were called Egypts or Aegypts, signifying "armed shepherds," who are supposed to have been the soldiers. A third were named Agag, supposred to be the chiefs or nobles of these armed shepherds: whence the title of king of kings, according to Mr Bruce, is derived; and he supposes Agag killed by Samuel, to have been an Arabian shepherd.

The building of Carthage augmented the power of the Shepherds to a considerable degree, by reason of the vast quantity of carriage naturally belonging to a place of such extensive commerce, and which fell into the hands of the Libyans or Libyan peasant. An immense multitude of camels in the early ages, answered the purpose of navigation: and thus we find that commerce was carried on by the Libyans as early as the days of Joseph from the southern extremity of the Arabian peninsula. These Shepherds, however, though generally the friends and allies of the Egyptians, who were also Cushites, sometimes proved very bitter enemies to them, as is related in the history of that country. The reason of this may be deduced from the great opposition betwixt their manners and customs. The Egyptians worshipped black cattle, which the Shepherds killed and used as food; the latter worshipped the heavenly bodies, while the Egyptians were the grossest idolaters, and worshipped idols of all kinds that can be imagined. Hence a mere difference in religion might occasion many bloody quarrels; though if the above account can be depended upon as authentic, it is natural to imagine that the mutual connection of interest should have cemented their friendship, whatever difference there might happen to be in opinions of any kind.

Besides the Cushites and Shepherds, however, we must now seek for the origin of those different nations which have already been mentioned. Mr Bruce allows that there are various nations inhabiting this country, who are fairer than either the Cushites or the Shepherds, and which, though they have each a particular name, are all known by the general title of hebilk; which may be translated by the Latin word conveneri, signifying a number of distinct people meeting accidentally in one place; and which our author maintains against Scaliger, Ludolf, and a number of others, to be a very just translation, and exceedingly consonant to the history of the country.

The most authentic ancient history of this country, according to Mr Bruce, is the chronicle of Axum: the character of which, among the modern Abyssinians, stands next to the sacred writings themselves; and consequently must be esteemed the highest Abyssinian authority we have on the subject. According to this book, there was an interval of 5500 years between the creation of the world and the birth of Christ; 1508 years before which last event the empire of Abyssinia or Ethiopia received its first inhabitants. Two hundred years after its settlement, it was fo destroyed...
The country laid waste by a pestle.

The queen of Sheba, or a country laid waste; "or (says our author) as it is called in scripture itself, a land which the waters or floods had spoiled." (Is. viii. 2.) The peopling of the country was finished about 1490 years before Christ, by the settlement of a great number of people, speaking different languages, who sat down peaceably in the high lands of Tigre, in the neighbourhood of the Shepherds, with whom they were in friendship.

These people, according to tradition, came from Palestine; and our author is inclined to believe the whole of the relation to be true, as the time coincides with the expulsion of the Canaanitish nations by Joshua, which happened about 1490 B.C. ten years before which there had been, according to Pausanius, a flood in Ethiopia, which occasioned prodigious devastation. Ethiopia, he thinks, would afford the first opportunity of seeing the Canaanitish nations by Joshua, the son of Nun, the robber.

The authenticity of these inscriptions, however, is much disputed, and therefore it cannot go a great way in establishing any historical point. The first and most considerable of the colonies above-mentioned settled in the province of Amhara; the second in Damot, one of the southern provinces; the third in another province called Lafta, or Tcheralz-Agow, from Tharaz-Aywu, their principal habitation; and a fourth in the territory of Gafat.

Our author goes on to prove, that the Ethiopians in ancient times were not only the most learned people in the world, but that they spoke the original language, and were the inventors of writing. In what manner they came to degenerate from this character, and into their present state of barbarity, cannot be known; this being a phenomenon equally unaccountable with the degeneracy of the Egyptians. According to some authors, the Ethiopians were conquered by the Egyptians: of which transaction we have the following account. Before the time of that legislator, the Ethiopians possessed the country of Thespis in Egypt; but not content with this, they made an irruption into the Lower Egypt, and penetrated as far as Memphis; where, having defeated the Egyptians, they threatened the kingdom with total destruction. The Egyptians, by the advice of their oracles, put Moses at the head of their forces; who immediately prepared for invading the enemy's country. The Ethiopians imagined he would march along the banks of the Nile; but Moses chose rather to pass through some of the interior countries, though greatly infected with serpents, and where consequently his march must be attended with much danger. To prevent his men, he contrived a number of chalices or panniers of the Egyptian reed papyrus, which he filled with the birds named ibis, celebrated for their antipathy to serpents. As soon as he approached the track abounding with these reptiles, a sufficient number of the birds were let out, who presently cleared the way for the army by destroying the serpents. Thus the Ethiopians were surprised in their own country where they had dreaded no invasion; their forces, being defeated in the field, were at last shut up in the capital Meroe, a city almost impregnable, by being surrounded with three rivers, the Nile, Atopus, and Attaboras. The daughter of the Ethiopian monarch, however, having an opportunity of seeing Moses from the walls, fell in love with him, and offered to deliver up the city, provided he would swear to marry her. With this requisition the Jewish legislator complied; but treated the inhabitants with great severity, plundering the city, and putting many of the inhabitants to death. After this he ravaged the whole country, dismantling all the places of strength; and having thus rendered the Ethiopians incapable of attempting any thing against other nations for a considerable time, he returned in triumph to Egypt, after an absence of ten years.

From the time of Moses to that of Solomon there is a chain in the Ethiopic history. After this, how queen of Sheba; or, as others suppose to have been sovereign of Ethiopia Propria: but Mr Bruce is of opinion that she was only sovereign of that territory on the eastern coast of Africa named Saba, which he says ought to be her title instead of Sheba. In favour of this opinion he likewise urges, that it was customary for the Sabeans, or inhabitants of the African district named Saba, to be governed by women; whereas those who inhabited the opposite side of the Arabian gulf, and who were named Sabeans, were not only governed by Kings, but would not allow their sovereigns to go abroad anywhere under pain of being stoned to death. The Abyssinians, as has been already hinted, claim her for their sovereign; and he informs us, that having received an account from Tamarin, an Ethiopian merchant, of the surprizing wisdom and wealth of Solomon, she undertook the journey mentioned in Scripture, to ascertain the truth of the report. In this she was attended by a great many of her nobility, carrying along with her also magnificent presents for the monarch she intended to visit. According to the Abyssinian historians, she was a pagan at the time this journey was undertaken, but being struck with admiration at the sight of Solomon's grandeur, and the wisdom he displayed, she became a convert to the true religion. Another part of her history, by no means inconsistent with the character of Solomon, is, that she returned in a state of pregnancy; and within a year was delivered, of a son, named David, by Solomon; but by his mother Menelech, Menielch, or Menelchee that is, another self. When he grew up he was sent to be educated at the court of his father Solomon; where having lived some time, he was accompanied home by many doctors of the law, and other Israelites of distinction, particularly Anzirah the son of Zadoc the high-priest.

By these the Jewish religion was established in Abyssinia, where it continued till the introduction of Christianity. The princes we speak of is named Makeda, Balkis, or Balkis, by the Abyssinians. By our Saviour, and in the Ethiopic version of the Scriptures, she is styled The Queen of the South, and is said to have come from the uttermost parts of the earth or of the habitable world. Hence the compilers of the Universal History have inferred, that
that the prince styled The Queen of Sheba in scripture was really sovereign of Ethiopia. "Ethiopia (lately) is more to the south of Judaea than the territory or kingdom of Saba in Arabia Felix; consequently he is a greater claim that this country for the dominion of the prince whom our Saviour calls The Queen of the South. Ethiopia is styled the remotest part of the habitable world by Herodotus and Strabo; and therefore better agrees with what our Saviour has said of the queen of Sheba, that she came from 'the uttermost parts of the earth,' than Arabia. Nor can it be deemed a sufficient reply to this argument, that Arabia Felix was the uttermost part of the earth in respect to Judea, since it was bounded by the Red Sea: for that not only Egypt, but even Ethiopia, regions beyond that sea, were known to, and had a communication with, the Jews, both before and in our Saviour's time, is indubitably clear. Lastly, from what has been suggested, it appears no improbable conjecture, that Judaism was not only known, at least in a part of Ethiopia, but nearly related to the established religion there, at the beginning of the apostolic age, if not much earlier. After all, those two opinions, so contrary in appearance, may be made consistent without great difficulty; since it is agreed, that Arabia and Ethiopia having anciently borne the same name, been included during certain intervals in one empire, and governed by one prince. Part of the Arabs and Ethiopians had the same origin, and very considerable numbers of the Abaeni transported themselves from Arabia Felix into Ethiopia; a circumstance which sufficiently proves the intercourse that formerly subsisted between the Cushiotes or Ethiopians of Asia and Africa."

The Abisinian historians farther inform us, that the young prince Menilek was anointed and crowned king in the temple of Jerusalem, before he returned to his own country; that Azarias was constituted high-priest; that he brought with him an Hebrew transcript of the law; and though this book is now lost, having been burnt along with the church at Axum, the office is still continued in the line of Azarias, whose successors are styled Nebrits, high-priests, or keepers of the church, in that city; both church and state being modelled exactly after that of Jerusalem. Makeda continued to enjoy the sovereignty for 40 years; and the last act of her reign was to settle the succession to the throne. By this act the crown was declared hereditary in the family of Solomon for ever; it was also determined, that after her no woman should be entitled to wear the crown or act as sovereign of the country; but that the sovereignty should descend to the most distant heirs male, rather than to the females, however near; which two articles were to be considered as fundamental laws of the empire, not to be abolished. Lastly, that the male heirs of the royal family should always be sent prisoners to a high mountain, where they were to be confined till they should be called to the throne, or as long as they lived. This custom, according to Mr Bruce, was peculiar to Abyssinia; the neighbouring Shepherds being accustomed to have women for their sovereigns, which prevailed in the last century, and perhaps does so at present.

Makeda having established these laws in such a manner as not to be revocable, died in the year 986 B. C. The transactions of her son Menilek after his accession are not pointed out, further than that he removed his capital to Tigre. His reign can by no means be accounted prosperous; since in his time the empire was invaded by Shishak or Sisera the king of Egypt, who plundered the temple of Jerusalem under Nebuchadnezzar. He like wise attended a rich temple which had been built at Saba the capital of the Ethiopian empire, and which might very probably occasion the removal of the imperial seat to Tigre, as already mentioned. It is indeed pretty plain from Scripture, that Ethiopia, or great part of it, was subject to this monarch; as the Ethiopians or Cushiotes mentioned in his army which invaded Judaea, are joined with the Libyans or Libyans, and must therefore be accounted inhabitants of Ethiopia Proper. This is indeed no small confirmation of the opinion of Sir Isaac Newton, who agrees with Josephus in supposing Shishak to have been the celebrated Soscolitis of profane historians. Thus far we are certain, that in the passage of Scripture just now alluded to, the sacred historian indirectly ascribes the sovereignty of Ethiopia to Shishak; and we do not find it any where hinted that another Egyptian monarch was possessed of this sovereignty. Herodotus also plainly tells us, that Soscolitis was master of Ethiopia, and that no other Egyptian but himself ever possessed that empire.

During the reign of Shishak we know no particulars concerning the Ethiopians; but after his death, they remained, perhaps, under the dominion of his successors, until Menelik ascended the throne. He is of opinion, that the Egyptians from entering Ethiopia. He is also supposed to have been the son of Zerah, and to have died in a very advanced age about 90 years after the decease of Solomon. Thus, according to Sir Isaac Newton's chronology, the most remarkable transiations
tions of antiquity will be brought lower by ages than
by the usually received computations. According to
this, the Argonautic expedition happened in the time of
Aménophis, though some Greek writers inform us,
that the same prince ascended Priam king of Troy with
a body of forces. He was succeeded by Ramues, already
mentioned, who built the northern portico of the
temple of Vaulan at Memphis. The next was Moeris;
who adorned Memphis, and made it the capital of his
empire, about two generations after the Trojan war.
Cheops, Caphres, and Mycerinus, succeeded in order
Moeris; the last being succeeded by his father
Nechoes.

In the reign of Acheses his successor, both
Ethiopia and Assyria revolted from Egypt; which,
being now divided into several small kingdoms, was
quickly subdued by Sabacon or So, the emperor of
Ethiopia. This monarch, soon after his accession to
the throne of Egypt, allied himself with Hoshea
king of Israel; by which means the latter was induced to
revolt from the Assyrians; and in consequence of this,
an end was put to the kingdom of Israel by Shalman-
asser king of Assyria, in the 24th year of the era of
Nabonaifar, and 720th before the commencement of
the Christian era. According to Herodotus, this mon-
arch voluntarily resigned the crown of Egypt after he
had enjoyed it 50 years; but Africanus relates, that
after a reign of eight years he died in Egypt, in the
ninth year of Hezekiah, king of Judah. His successor
Sethon, supposed to be the Seveches of Manetho,
advanced to Pelusium with a powerful army against Sen-
nacherib king of Assyria; when the bowstrings of the
Assyrians were gnawed in pieces by a great number of
rats or mice, and thus they were easily defeated with
great slaughter by the Egyptians. Hence Herodotus
 informing us, that the statue of Sethon which he saw
in Egypt had a mouse in its hand. Sir Isaac Newton,
however, explains the whole in an allegorical manner.
As the mouse among the Egyptians was a symbol of
destruction, he conjectures, that the Assyrians were on
this occasion overthrown with great slaughter; and
that Sethon, in conjunction with Terahakah, either king
of the Arabian Cushites, or a relation of Sethon and
his viceroy in Ethiopia Proper, forsook and defeated
Sennacherib between Libnah and Pelusium, making
as great slaughter among his troops as if their shield-
flays and bowstrings had been destroyed by mice.

In the 78th year of the era of Nabonaifar, the
empire of Ethiopia was subdued by Escharodon king of
Assyria; who held it three years committing enor-
mous cruelties both in that country and in Egypt.
After his death the Ethiopians shook off the yoke, and
maintained their independence till the time of Cyrus the
Great, the first king of Persia; who, according to the
Greek historian Xenophon, seems to have also
sovereign of Ethiopia. After his death they revolted,
and his son Cambyses unsuccessfully attempted to re-
duce them. Herodotus informs us, that before he un-
dertook this expedition, he sent some of the Ichthyo-
phagi ambassadors to the king of the Macrobii or long-
lived Ethiopians, under pretence of soliciting his friend-
ship, but in reality to observe the strength of the coun-
try. Of this the Ethiopian prince was aware, and told
the ambassadors that he knew their design, reproached
Cambyses with his injustice and ambition, and gave
them his bow; telling them at the same time, that the
Persians might think of invading Ethiopia when they
could easily bend it; and in the mean time, that their
master ought to thank the gods who had never in-
spired the Ethiopians with a desire of extending their
territories by conquest. Cambyses had sent by the
ambassadors a rich purple robe, gold bracelets, a box
of precious ointment, a vessel full of palm wine, and
other things, which he imagined would be acceptable
to the Ethiopian monarch. But all these, excepting
the wine were depilf. This, he owned, was superior
to any liquor produced in Ethiopia; and he did not
scurp to intimate, that the Persians, short-lived as
they were, owed most of their days to the use of this
excellent liquor. Being informed by the ambassadors,
that a considerable part of the food made use of by
the Persians was bread, he said that it was no wonder
to find people who lived on durst unable to attain the
longevity of the Macrobii Ethiopians. In short, the
whole of his answer was so contemptuous and disgui-
fing, that Cambyses was filled with the greatest indig-
nation; in consequence of which, he instantly began
his march without taking time to make the necessary
preparations or even to procure provisions of any kind
for his army. Thus a famine ensued among them;
which at last became so grievous, that the soldiers were
obliged to eat one another; and Cambyses himself,
finding his life in great danger, was obliged to give
orders for marching back again; which was not
accomplished without the loss of a great number of
men. Another army which he sent on an expedition
against Ammonia, in order to destroy the celebrated
oracle of Jupiter Ammon, perished entirely in the de-
aths, being overwhelmed with the vast clouds of sand
frequently raised there by the wind.

At this time, it is doubtful whether Cambyses would
have accomplished his purpose even if he had found it
practicable to march into the heart of Ethiopia. This
empire had but a short time before received a very
considerable accession of strength by the defeat of
240,000 Egyptians who had been posted by Phymmetricus
in different places on the frontiers. These not
having been relieved for three years, had gone over at
once to the emperor of Ethiopia, who placed them in
country disaffected to him; ordering them to expel the
inhabitants, and take possession of their lands. Not
withstanding this, however, Sir Isaac Newton hints,
that Cambyses conquered Ethiopia about the 225th or
224th year of the era of Nabonaifar; but his opinion in
this respect does not appear to be well founded.
We are told indeed, that the Persian monarch, not
withstanding the misfortunes he met with in the expedi-
tion above-mentioned, did really make himself mas-
ter of some of the Ethiopic provinces which bordered
on Egypt; and that these, together with the Troglo-
dytes, fent him an annual present of two chenixes of
unrefined gold, 200 bundles of ebony, five Ethiopian
boys, and 20 elephants teeth of the largest size: but
it appears improbable to the least degree, that even
though Cambyses had employed the whole of his reign
in the attempt, he could have conquered the vast re-
ions of Ethiopia Proper, Sennaar, and Abyssia, which
were all included in the Ethiopia of the ancients.

When Xerxes invaded Greece, we find his army,
Ethiopians according to Herodotus, was partly composed of Eth-
employed
opians, of whom Herodotus mentions two distinct races by Xerxes.
Greece in order to invade Arabia, Candace queen of E- 
Ethiopia, or perhaps rather of the island or peninsula of 
Ethiopia, took the opportunity of an irruption, with a numerous army, into the province of 
Thebais. As there was at that time no force to 
oppose her, she met for some time with great success; 
but hearing at last that Theodosius, governor of Egypt, 
was in full march to attack her, she retired into her 
own dominions. Petronius pursued her as far as 
Plechas, where with 10,000 men he gained an easy 
victory over 30,000 undisciplined Ethiopians savages, 
among only with poles, hatchets, and other clumsy or 
inignificent weapons of a similar nature. This 
victory was soon followed by the reduction of several 
fortresses; however, as the Roman soldiers were 
excellently incommunicated by the heat of the climate, 
Petronius, notwithstanding his success, was obliged at 
last to retire. Soon after, Candace sent ambassadors 
to Augustus himself with such magnificent presents, 
that the emperor is said to have been thereby induced 
to grant her a peace on her own terms. From this 
the Romans accounted themselves masters of 
Ethiopia: Augustus was complimented on the great 
glory he had acquired; and that he had, by reducing 
a country till that time even unknown to the Romans, 
finished the conquest of Africa. No material alteration, 
however, took place in the affairs of Meroe in 
consequence of this conquest, whether real or pretended. 
Pliny informs us, as well it had been governed by 
queens, who bore the title of Candace, for several 
generations before that time; and so it continued to be 
considerably, as we learn from Scripture, where we are 
 informed that, in the reign of Tiberius, the sovereign 
of Ethiopia was still named Candace. Some indeed 
are of opinion, that the Candace mentioned in the Acts 
of the Apostles was the same with her who had been 
 conquered by Augustus; but this seems by no means 
probable, as the interval of time is by far too long to 
be allowed for the reign of a single prince.

From an anecdote of the debauched emperor Heliogabalus, who was accustomed to confine his favourites, 
even the king of the Ethiopians, in a cabinet, and 
speak of diversion, whose name was there, Carus the 
theft, a back and two sides. Behind this chair there 
was a large stone three cubits high, which had sustained 
considerable injury from this time. This stone 
and chair contained an inscription to the following pur- 
pose: 'Ptolemy Euergetes penetrated to the farthest 
parts of Ethiopia. He subdued Gaza, Agame, Signe, 
Ava, Tiamo or Tziamo, Gambia, Zingabene, Angabe, 
Tiamo, Athaagso, Cala, Semene, Lafone, Zaa, 
Gabala, Atalino, Bega, the Tangaiati, Aine, Metine, 
Sefca, Raufo, Solate, the territory of Raufo, and sev- 
eral other kingdoms. Among the nations he reduced, 
were some inhabiting mountains always covered with 
a deep snow; and others seated upon ridges of hills, 
from whence issued boiling stremes and craggy precip-
ices, which therefore seemed inaccessible. Having 
finally, after all these conquests, assembled his whole 
army at Adale, he sacrificed to Mars, Neptune, and 
Jupiter; for his great success, he dedicated this chair 
or throne to Mars. ' 

From the time of this conqueror to that of the em- 
peror Augustus, we meet with nothing of any con- 
sequence relating to Ethiopia Proper. The Roman 
forces having about this time been drawn out of E-
version to Christianity, we find nothing remarkable in the history of the Ethiopians. Three hundred and twenty-seven years are counted from the time of our first mention to that of Abreha and Atzebeha, or from Ab- raha and Afba, who enjoyed the kingdom, when the gospel was preached in Ethiopia by Frumentius. This man was a kinsman and companion of a philosopher named Meropias, a native of Tyre; who, having travelled all over India, died on an island in the Red Sea. After his death Frumentius, with another named Adefius, who had also been his companion, were brought before the king of Ethiopia, to whom that island was subject. He took them into his service; making the one his treasurer and the other his butcher. On the death of this prince, the queen conceived such a favour for them, that she refused to allow them to depart out of the kingdom; but committed the management of her affairs entirely to Frumentius, who made use of his influence to diffuse the Christian religion throughout the country, and at last was appointed bishop of Axuma. It is said, however, that the court and principal people, if not the nation in general, relapsed into idolatry, which continued to prevail till the year 521, when they were again converted by their king Adad, or Adag.

The two princes Abra and Afba, who reigned jointly in Ethiopia in the time of Frumentius, lived in such harmony together, that their friendship became almost proverbial. After being converted to Christianity, they adhered filially to the orthodox doctrine, refusing to admit an Arian bishop into their country. In the time of the emperor Constans, however, this heresy was introduced, and greatly favoured by that monarch; and an attempt was made to depose Frumentius on account of his refusal to embrace it.

The reign of these princes is remarkable for an expedition into Arabia Felix, called by the Mahommedan writers the war of the elephant, and which was undertaken on the following occasion: The temple of Mecca, situated nearly in the middle of the Arabian peninsula, had been held in the greatest veneration for near 1,400 years; probably from the notion entertained by the people in the neighbourhood, that Adam pitched his tent on that spot. Here also was a black stone supposed to possess extraordinary sanctity, as being that on which Jacob laid his head when he had the vision of angels. The most probable account of the real origin of this temple, according to Mr Bruce, is, that it was built by Seofofris, and that he himself was worshipped there under the name of Osiris.

On account of the veneration in which this tower and idol were held by the Arabs, Mr Bruce supposes that the thought was first suggested of making it the emporium of the trade between India and Africa: but Abra, in order to divert it into another channel, built a very large temple near the Indian ocean in the country of the Homerites: and to encourage the refund of people to this new temple, he bestowed on it all the privileges of the former which stood in the city of Mecca. The tribe of Ethiopians named Korisil, in whose country Mecca stood, being exceedingly alarmed at the thought of having their temple defiled, entered the new one in the night, burned all that could be consumed, and bewreathed the remains with human excrements. Abra, provoked at this farce, assembled a considerate army, with which he invaded Mecca, himself appearing on a white elephant, from whence the war took its name already mentioned. The termination of the war, according to the Arabian Miraculous history, was miraculous. A vast number of birds named Abuth came from the sea, having faces like the Ethiopian lions; each carrying on its claw a small flame about the size of a pea, which they let fall upon the Ethiopian army in such numbers, that every one of them was destroyed. At this time it is said that the small-pox first made its appearance; and the more probable account of the destruction of the Ethiopian army is, that they perished by this distemper.

The war of the elephant is supposed to have terminated in the manner above mentioned about the year 520; from which time to that of Elebaan, named also Calch, and probably the same with Adad or Adag already mentioned, we meet with nothing remarkable in the Ethiopic history. He engaged in a war with the Homerites or Sabaans in Arabia Felix; whom he overthrew in battle, and put an end to their kingdom; after which he embraced the Christian religion in token of gratitude for the favours he had met from Elebaan. In the time of this prince a violent persecution of the Christians took place in Arabia. The Jewish religion had now spread itself far into that peninsula; and in many places the professors of it were become absolute masters of the country, infomuch that several Jewish principalities had been erected, the sovereigns of which commenced a severe persecution against the Christians. Among the rest, one Phineas distinguished himself by his cruelty, having prepared a great number of furnaces or pits filled with fire, into which he threw those who refused to renounce Christianity. The Christians applied for relief to the emperor Justin; but he being at that time engaged in a war with the Persians, could not interfere: however, in the year 522, he sent an embassy to Elebaan, who was now also a member of the Greek church, intreating him to exert himself for the relief of the Christians. On this the emperor commanded his general Abras, governor of the Arabian province Yemen, to march to the assistance of Aresias, son to the prince of the same name whom Phineas had burnt; while he himself prepared to follow with a more confiderable force. But before the arrival of the Ethiopian monarch, young Aresias had marched against Phineas, seized, and entirely defeated him. In a short time afterwards the emperor himself arrived, and gave Phineas a second defeat: but notwithstanding these misfortunes, it does not appear that either the principality of Phineas or any of the other Jewish ones, was at this time overthrown; though it seems to be certain, that at the time we speak of, the Ethiopians possessed part the Arabian peninsula. According to the Arabian historians, the war of the elephant, with the miraculous destruction of the Ethiopian army already mentioned, took place in the reign of Elebaan.

Some historians mention, that the Ethiopian monarchs embraced the doctrines of Mahomet soon after the impostor made his appearance; but this seems not to be well founded: though it is certain that the Najafib or Ethiopian governor of Yemen embraced Mahommedanism, and that he was related to the royal family. On this occasion, however, the Ethiopians left...
Judith. 

An extraordinary revolution took place in the 12th year of his dominations, when the lineal descendant of the whole royal family on a rock named Damo, which many rivers, whose streams contribute to increase that of the Nile, empty themselves; and had this been accomplished, there is no doubt that the loss of Egypt would have been very sensibly felt by the Egyptians. According to most historians, this enterprising monarch was prevented from putting his design in execution, though Mr. Bruce informs us of a written account at Sha, in which it was asserted, that he was dissuaded from it by certain monks, who told him, that by sending down such a quantity of water to the eastern and dry parts of Africa, these countries would soon become so fertile and populous that they would rival the empire of Ethiopia, or at least withdraw their allegiance to it entirely. The remains of these works were seen by the Portuguese ambassador in 1522.

All this time the princes of the line of Solomon had been obliged to content themselves with the sovereignty of the province of Xoa and Sha, without making any attempt to regain their former dignity; but they were unexpectedly restored without bloodshed or disturbance by Nacuetro Laeb, the grandson of Lalibala abovementioned. This prince, being of a gentle and pacific disposition, was persuaded by a monk named Tecla Haimanout, greatly celebrated for his sanctity, to reign the crown, to which, though he received it from his father, he could not pretend any abso late right. In consequence of the mediation of this monk, therefore, it was agreed that Nacuetro should give up the empire to Icon Amlac the lineal descendant of Solomon, who then possessed the sovereignty of Sha. In consequence of this a portion of lands should be irrevocably and irremovably assigned to him and his heirs; and he should likewise be allowed some marks of sovereignty as a testimony of his former grandeur. In this treaty, however, the good monk did not forget his own interest. He had founded a famous monastery in Sha, and was primate of the whole empire under the title of Abuna. He now informed that one third of the kingdom of Ethiopia should be absolutely ceded to himself for the maintenance of his own dignity, and the support of the clergy, convents, &c. throughout the country; he also intimated that no native Abyssinian should ever enjoy the same dignity with himself, even though he should have been chosen and ordained at Cairo, as was the custom with the Abyssinian prelates.

These extraordinary terms were complied with, and it is said
Icon Amalan raised to the throne of Ethiopia. He did not, however, remove the fact of government from the province of Sho'a; but continued at Taguulat the capital of that province during the whole of his lifetime, which continued 15 years after his accession to the throne of Ethiopia. We are ignorant of the transactions of his reign, as well as that of several of his successors, five of whom ascended the throne in as many years.

From this quick succession Mr Bruce is of opinion, that a civil war had taken place among the candidates for the throne, but the Abyssinian annals make no mention of this; neither have we any particular account of the transactions of the empire till the time of Amsa Sion, who began to reign in 1312. He was the son of Wedem Aarad, the youngest brother of Icon Amalan, and succeeded to the throne on the death of his father. He professed the Christian religion; but his practice seems to have been very opposite to its precepts. He began his reign with living publicly with a concubine of his father's; and quickly after committed incest with his two sisters. On this he was first exiled to repentance, and then excommunicated by Honorius, a monk greatly celebrated for his sanctity, but who has since been canonized. The prince, enraged at this indignity, caused the faint to be severely whipt through every street of his capital. That night the town was by some unknown means set on fire and reduced to ashes: the clergy persuaded the people, that the blood of Honorius had turned to fire as it dropped on the ground, and thus occasioned the catastrophe; but the king suspecting that the monks themselves had been the incendiaries, banished or imprisoned them all, so that their hopes of exciting an innovation were disappointed; and being dispersed into those provinces where the inhabitants were mostly Jews or Pagan, they were now obliged to apply to what was certainly more incumbent upon them, viz. the diffusion of the knowledge of the gospel.

While the king was buffeted with the monks, one of the factors, who had been entwined with some of his commercial interests, was assassinated by the Moors in the province of Ifyat, on which, without making any leaf complaint or expostulation, he assembled his troops, and with seven hundred men (A) fell upon the nearest Mahometan settlements, massacring all those he met without exception. Putting himself then at the head of his army, he proceeded in the most rapid career of devastation, laying waste the whole country with fire and sword, and carrying off an immense booty.

For some time the Moors were so surprized that they did not think of making opposition; but at last they took up arms, and attempted to surprize the Abyssinian monarch in his camp, hearing that he had sent out most of his army in detachments. With this view they approached the camp in the night-time, expecting to have found the king and his few soldiers in sleep. Unexpectedly, however, he had been joined by a considerable part of his army, whom he drew up in battle array to receive his enemies. An engagement ensued, in which the king behaved with great valour; killed the Moorish general with his own hand, and gained a complete victory. He then commanded such of his soldiers as could not find houses ready built, to build huts for themselves, and a large tract of land to be plowed and sown, as if he meant to stay in the country of the enemy during the rainy season.

The Mahometas now perceiving they were in danger of being totally exterminated, willingly submitted to the terms he pleased to impose upon them, while the monarch conciliated the affections of his people by dividing among them the vast plunder he had acquired in this expedition.

The Moors no sooner found themselves freed from any apprehensions of immediate danger, than they prepared for a new revolt. The king having intelligence of their designs, secretly prepared to subdue them before they could have time to bring matters to a sufficient bearing. The Moors, however, being better prepared than he expected, began hostilities by surprising and plundering some villages belonging to the Christians, and destroying their churches. A most formidable combination had taken place; and as the consequence of allowing the confederate rebels to join their forces might have been very dangerous, the king used his utmost endeavours to prevent it: This design was in some measure facilitated by the superintention of Amano king of Hadea, one of the principal rebels. This king of Hadea, by the advice of a conjurer, in whom he put great confidence, instead of marching his troops to the assistance of his allies, remained at home with them, where he was defeated and taken prisoner by a detachment of the king's army. The governor of Ambara was next dispatched against Saber Edén another Abyssinian general, who soon after joined the king with his whole army. This proved fatal to the rebel cause; Saber-Edén no longer able to support himself against the royal forces, was obliged to surrender at discretion, and all the rest were quickly reduced; so that the king was at leisure to march against the king of Adel and Mara, who having united their forces, resolved to give him battle.

At this the Abyssinian monarch was so exasperated, that he determined to take a most ampler vengeance on his enemies. In the presence of his whole army, therefore

(A): On this Mr Bruce remarks, that "it has been imagined the number should be increased to 70; but there would be little difference in the rathments of the action." The word in the Abyssinian annals which he translates is seven; but if we increase the number at all, it ought more probably to be to seven hundred than seventy.
E T H

fore, and a mask of uncommon sanctity, dressed in the
same habit in which he usually performed divine ser-
vice, the king made a long speech against the Maho-
medans. He recounted the things of which they had
committed, and of which the kings of Adel and Mara
had been principal promoters. He enumerated many
elements of murder, sacrilege, &c., of which they had
been guilty; setting forth also that they had carried off
great numbers of Christians into slavery, and that the
view of making slaves was now a great motive with them
for making war. He dis-
claimed every idea of commencing hostilities from any
avaricious motive; as a proof of which, he denied
that he would accept of any part of the plunder for
his own use; concluding with a declaration, that
he was now about to swear on the holy eucharist,
that, though but 20 of his army should join him,
he would not turn his back upon Adel or Mara, till
he had either forced them to tribute and submission,
or entirely extirpated them and annihilated their re-
ligion." After this speech, he took the oath in the
presence of the whole army; who not only applauded
him with loud shouts, but pledged that they looked
upon themselves to be all bound by the oath he had
taken. As he had mentioned in his speech that the
plunder had been purchased by the lives of their
Christian brethren, they determined to show their
abhorrence at keeping any of it on their terms. Taking
lighted torches in their hands, therefore, they set
fire to the whole plunder that had been amassed since
the beginning of the war; and having thus reduced them-
selves to a state of poverty, they prepared to show their
Christianity by thirsting, not after the wealth, but the
blood of their enemies.

Now notwithstanding the enthusiasm of the whole army
on this occasion, the expedition was attended with
great difficulties. These arose principally from super-
stition; and as, on the one hand, the Abyssinians were
by this principle laid under considerable disadvantages,
their adversaries on the other enjoyed equal advantages
from no better cause. The Abyssinians, according to
Mr Bruce, are very credulous with respect to genii or
spirits which go about doing mischief in the dark.
Here was an object for their adoration, and the many
evenings which fell upon some spirits and provoked
fighting, in the night-time; because they imagine that
the world is then entirely given up to these beings, who
are put out of humour by the motions of men, or of any
other terrestrial creature. In the night-time therefore an
Abyssinian dares not even throw a little water out of a ba-
fon, lest it should fall upon some spirit and provoke it to
vengeance. The Moors, on the other hand, tho' equally
fearful, secure themselves against these invisible enemies
by means no less ridiculous than the fears themselves. A
verse of the Koran, fewed up in leather, and worn round
their neck or arm, is sufficient to defy the power of the
most mischievous genii. Under such powerful protec-
tion, therefore, they laugh at the terrors of the Aby-
sinians, and are on all occasions ready to attack them
in the night-time, and even choose that season rather
than any other forthcoming to an engagement. Sensitive
of this advantage, and encouraged by the little los-
which attended even a defeat in these nocturnal en-
counters, they determined on the present occasion to
avoid any pitched battles, and to content themselves with
harassing the king's army by continual skirmishes of
this kind. Thus, though the Abyssinian monarch had
always the advantage, his troops soon began to com-
plain; and, on the commencement of the rainy sea-
son, infested on being allowed to return.—This was by
no means agreeable to a prince of such a martial dispo-
sition as Amsa Sion. He therefore told them, that,
if they were afraid of rains he would conduct them to a
country where there were none; meaning Adel, which,
though likewise within the limits of the tropical
rains, has them at another season than that in which
they fall in Abyssinia. Thus he persuaded his army
again to set forward; but was so grievously harassed by
the nocturnal attacks of the Moors, that he was
once more in danger of being deflected; and when by
his eloquence he had found means to dissuade the ap-
prehensions of the soldiers, he was seized with such a
violent fever as threatened his life. The soldiers now
Heis feiled expected that they were soon to return; but while
they indulged themselves in the carlessnefs which usual-
lly attends an expectation of this kind, they accidentally
received intelligence that the Moors, having assembled
an army of 40,000 men, were in full march to attack
them, and at a very small distance. The king was
now free from fever, but so weak that he fainted on
attempting to put himself in readiness for going out to
battle. Still, however, his resolution continued firm
and unalterable; having recovered from his faint, wath-
ced and refreshed himself, he made a speech to his fol-
diers, filled with the most enthusiastic expressions of
confidence in the justice and goodness of the cause in
which he was engaged, and in the continuance of his
divine favour and protection. "As it never was my
opinion (said he), that it was my own strength and
value, or their want of it, which has so often been
the cause of preferring me from their hands; so I do
not fear at present that my accidental weakness will
give them any advantage over me, as long as I trust in
God's power as much as I have ever done." By this
speech the drooping spirits of the Abyssinians were
revived; and they only begged that their monarch
would now trust to the value of the troops, and not expose
his person to such danger as he had nably done. He
promised to comply with their request; but matters di-
ferent were soon thrown into confusion; for the Moors
had poisoned the wells and enchanted all the run-
ning water in the front of the army. The poisoned
wells, however, were easily avoided; and a priest of
the bas faith was dispatched a day's journey before
the army to defenchat the waters by his blessings,
which, having the advantage of the good qualities of
the element itself on their side, were doubtles more
powerful than the spells of the infidels. Not content
with this, the king caufed a river to be consecrated by
the name of Jordan; but while his men were employ-
ed in bathing themselves in this holy water, the Pitt-
Auraris, an officer who had been dispatched with a
party of men who always go before the Abyssinian
armies, was attacked and driven back on the main body
by a detachment of the enemy, who had along with
a number of women provided with drugs to poison
and spells to enchan the waters. On this a dread-
ful panic seized the whole army; who, unmindful of the
promises made to their king, not only refused to a panic, and
advance, but for the most part came to the resolution reo to
delay of leaving their camp, and returning homewards without
engage.
delay. The king, sensible that all was lost if this perni-
cious scheme should be adopted, did his utmost to pro-
duce courage and persuade them to return to their duty; but per-
ceiving that nothing was to be gained by reasoning with
men so much terrified, he only, requested that such as
could not be induced to fight, would not leave their
places, but stand quiet spectators of the battle. Even
this had very little effect; so that, finding the enemy
now ready to make an attack, he ordered his master
of the horse with only five others, to attack the left
wing of the enemy; while he, with a small party of
his servants, made an attack on the right. This de-
sperate action was attended with success. The king,
notwithstanding the weakness he yet laboured under,
killed with his own hand two of the commanding of-
icers of the enemy’s right wing; while his son dis-
patched another of considerable rank belonging to the
left. This had such an effect upon the whole Moors
army, that they began evidently to lose courage; while
the Abyssinians, alarmed at their conund, now rushed
furiously to rescue their prince from danger. The
battle continued for some time with great obstinacy;
but at last the centre and left wing of the Moors were
entirely defeated. The right wing, composed principally
of Arabians, retired in a body; but, not knowing the
country, they entered a deep valley surrounded by
perpendicular rocks entirely covered with wood. The A-
bysinians, imagining they had nothing more to do,
began to flay and mangle the bodies of the killed and
wounded; but the king, perceiving that the Arabians
had brought themselves into a situation from whence
they never could be extricated, obliged his soldiers to
defend their barbarous employment, and even killed
two of them who disobeyed his orders. The army
was then divided into two parts, one of which sur-
rounded the devoted Arabians, while the other was
sent a day’s journey after the remainder of the Moors.
Both parties proved equally successful. The king with
part of his division attacked the Arabians in front,
where the rest rolled great stones down from the tops
of the rocks upon them. By this they were thrown
into such confusion, that being neither able to fly nor
refit, they were all killed to a man. The fate of the
Moors was little better. The other division of the
Abyssinian army found them lying round a large pool
of water, which they lingered by; but the king, perceiving
this helpless situation there was nothing requisite but
to order them to be slaughtered; and this cruel order
was executed with the utmost precision. The soldiers
imagining they should now discharge their vow to heav-
en, wearied themselves with slaughter; till at last,
being almost satiated with blood, they made a few pri-
soners, among whom was Saleh king of Mara with his
queen; the former of whom was hanged by order of
Amda Sion, and the latter cut in pieces, and her
body given to the dogs by the soldiers.

Amda Sion pursues his advantage.

This signal victory was gained in the end of July
1756; but as the rains at that season fell in violence
most of the army now again insisted on their re-
turning home without delay. The king and principal
officers, however, were of opinion, that the advantages
so dearly purchased ought by all means to be pursued
until they had either reduced the Mahometans to subjec-
tion, or at least deprived them of all power to make at-
tacks on the empire with any prospect of success. This
opinion being adopted, the king sent back the baggage,
women, and others who could be of no use to the ar-
my; retaining only the veteran soldiers, who were able
to encounter more than six times the number of such
enemies as he could expect to meet with. Advancing
farther into the Mahometan territories, he took up his
residence in a large town called Zeyla; from whence
he, that very night, sent out a detachment, to forrice
a large village in the neighbourhood named Taraca.
This was executed with success; the men were massa-
cred, and the women kept to supply the places of those
who had been sent away. Continuing still to advance
he detached parties to lay waste the countries all round;
and in this expedition he had the good fortune to cut
off two of the principal authors of the conspiracy
against him. He then proceeded to invade Tahal and
Abalge in the territories of the king of Adel. That
monarch, now rendered desperate by the view of ap-
proaching ruin, had assembled all the troops he could
raise, in order to make one last effort against the en-
cemy; but conducted himself with much less prudence
than he ought to have done when contending with such
an experienced and vigilant adversary. Amda Sion,
confident of success, took no leaf care how to prevent
the enemy from escaping than how to gain the victory.
For this purpose he dispatched parties of horse to lie in
wait in all those avenues by which he supposed that
the Moors might attempt to make their escape; after
which, falling furiously on the Adelians himself, and being
well supported by his troops, he gained a complete vic-
tory; the king of Adel, with great numbers of his sub-
den, being killed on the spot, and almost all the rest
left and extingiished with the parties of horse whom the Aby-
sian monarch had posted in ambush to intercept them.

As the lots of this battle rendered the affairs of
the Adelians quite desperate, the three young princes, sons
to the late king, with their uncle, waited upon Amda
Sion with rich presents, which they laid at his feet
in the most humble manner, putting their foreheads
in the dust, and intreating his pardon; professing their
subjection and readiness to obey his commands, provi-
ded that he would spare the remainder of their country
and property. To this the king made a very unfa-
vourable reply, reproaching them with indignities done
to himself; but especially with the sacrilege they had
committed in burning the church of Adel; and the murder-
ing priests, destroying also defenceless people in villages, merely
because they imagined that he would not protect them.
To punish those and other crimes, he said, he was now
in the heart of their country; and he was determined
never to turn his back upon Adel while he had ten men
capable of drawing their swords; for which reason he
commanded them to return and expect the approach of
his army.

By this fierce speech the brother and two eldest
children of the king of Adel were so disheartened, that
they could not speak; but the youngest son made a
very spirited speech, in which he attempted to soften
the king by complimenting his valour, and showing
that it was unworthy of his character to push the war
against a people who were already conquered and de-
senecles. All the answer he could obtain, however,
was, that unsafe the queen with the rest of the royal
family, and the principal people the nation, would received
by to-morrow evening and surrender themselves

have made
one of

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At the same time they dispatched messengers to the princes, requesting them to make their escape with all manner of expedition, and to head the army themselves; all of whom were determined to conquer or die as soon as the royal family should be out of the enemy's hands. By this conduct the Abyssinian monarch was so much irritated, that he divided his army into three parts; two of which he commanded to enter the territory of the enemy by different routes, and to exterminate both man and beast wherever they came; while he himself, with the third, took the straight road to the place where the new Adel Claims army was encamped. Here he found a number of infantry, and a party of horse ready to engage him; but, besides these, there was a multitude of old men, women, and even children, all armed with felony weapons as they could procure. Surprised at this fight, he ordered a party of horse to disperse them; but this was found impossible; so that he was obliged to call in the detachments he had sent out, with orders to fall upon the enemy by the nearest way they could advance. The engagement was for a long time very doubtful; and in opposition to Amda Sion appeared the young king of Wypo, who, wherever he encouraged his troops, and made the most obstinate resistance. The Abyssinian monarch having observed him, heathed his sword, and arming himself with a bow, chose the broadest arrow he could find, and took his aim, that he might strike young prince through the side of the neck, and his head inclining to one shoulder he soon fell down dead. On this the spirit of the Adelians entirely forsook them, and they betook themselves to flight; but unluckily falling in with two Abyssinian detachments coming to the king's relief, they were so completely destroyed, that only three of them are said to have made their escape. On the side of the Abyssinians, however, the victory was dearly purchased; many of the principal officers being killed, and fearlessly one of the cavalry escaping without a wound.

The remainder of this expedition consisted only in the devastation and burning of towns and villages, and massacres of helpless people, on pretence of retaliating the injuries committed by the Mohomans against the Christians. At last, weary of conquest and of carnage this victorious monarch, who never suffered a defeat in any battle, returned in triumph to his capital, where he ended his days after a reign of 30 years. In this time we find that the royal family were not confined as had been the usual practice from the time of the queen of Sheba to the massacre by Judith; for Saif Araad, the son and successor of Amda Sion, distinguished himself in one of the battles in which his father was engaged.

Although the new prince, as appears from what has been just now observed, was by no means deficient of military talents, the Abyssinian empire enjoyed a profound peace during his reign. The only remarkable transaction was the relief given by him to the Coptic patriarch, whom the sultan of Egypt had thrown into prison. At this time a great trade was carried on through the desert by caravans between Cairo and Abyssinia, as well as from Cairo and Suckem on the Red Sea; but the Ethiopic monarch having feized the merchants from Cairo, and sent parties of horse to interrupt the caravans in their pilgrimage, the sultan was soon content to release the patriarch, whom he had imprisoned only with a view to extort money.

In the reign of Theodorus, who held the crown of Ethiopia from the year 1409 to 1412, we find an infringement made on the treaty between Icon Amlac and the Abuna Tecla-Haimantout formerly mentioned. By that treaty the Abuna was to have a full third of the whole empire for the support of his own dignity and that of the church: but Theodorus, justly considering this as an unreasonable acquisition, reduced it very considerably, though he still allowed a very ample revenue out of every province of the empire; and even this has been contested by several of his successors as far as one-half could have, consequently been frequently abridged by them. The annals of this prince's reign are very defective, and Mr. Bruce supposes that they have been mutilated by the ecclesiastics; which, considering what we have just now related of his reducing their revenues, is by no means improbable. By his subjects he was considered as such a fiant, that to this day the people believe he is to rise again and to reign a thousand years in Abyssinia; during which period war is to cease, and happiness to be universally diffused.

From the time of Theodorus to that of Zara Jacob, who began his reign in 1434, the Abyssinian annals furnish us with little or nothing of any consequence. The character of this prince is represented as by no means inferior to that of Theodorus, or indeed of any monarch that ever sat on the throne of Ethiopia, or any other kingdom in the world. He is in short set forth as another Solomon, and a model of what sovereigns ought to be; though, from some particulars of his reign, this character should seem to be rather exaggerated. The first remarkable transaction of this great monarch was his sending an embassy to the council of Florence. The ambassadors were certain priests from Jerusalem, who in that assembly adhered to the opinions of the Greek church; and the embassy itself was judged to be of such consequence as to be the subject of a picture in the Vatican. This prince obtained also a convention at Rome from the pope for the use of the Abyssinians; which is still preferred, though very seldom visited by those for whom it was designed. He seems to have been very desirous of keeping up a correspondence with the Europeans as well as the Afetics; and in his time we first read of a dispute in Abyssinia with the Frangi or Franks on the subject of religion. This was carried on in presence of the king between one Aba George and a Venetian painter, Francisco de Branco Lome, in which the former confuted and even convinced his antagonist; but from this time we find a party formed for the church of Rome, and which probably took its rise from the embassy to the council of Florence.

The prince of whom we speak was the first who introduced...
introduced perfection on a religious account into his dominions; and for this reason most probably he is so highly commended by the ecclesiastics. The state of religion in Abyssinia was now indeed very corrupt. The Greek profession had been originally established from the church of Alexandria; but in the low provinces bordering on the coast of Adel, the Mahometan superstition prevailed. Many of that persecution had also diffused themselves through the towns and villages in the internal parts of the empire, when not a few places the profest idolatry still took places, as the worship of the heavenly bodies, the wind, trees, cows, serpents, &c. All this had hitherto passed unnoticed; but in the reign of Zara Jacob, some families being accused of worshipping the cow and serpent, were brought before the king, who pronounced sentence of death upon them. Their execution was followed by a royal proclamation, that whoever did not carry on his right hand an amulet with these words upon it, "I renounce the devil for Christ our Lord," shall not only forfeit his personal estate, but be liable to corporal punishment. The spirit of persecution thus began, quickly diffused itself, and an inquisition was instituted for the detection of criminals. This was one Amda Sion, the king's chief confidant, who pretended to all that absurd and austerer devotion common to religious hypocrites. In this he was flattered with uncommon parade and attendance, the usual rewards of people of that stamp: as he never appeared abroad but with a great number of soldiers, trumpets, drums, and other insignia of military dignity waiting upon him. He kept also a number of spies, who brought him intelligence of those who were secretly guilty of any idolatrous or treasonable practices; after which, proceeding with his attendants to the house of the delinquent, he caused the family first supply himself and his party with refreshments, and then ordered the unhappy wretches to be all put to death in his presence. Among those who suffered in this barbarous manner were the two sons-in-law of the king himself, who had been accused by their wives, the one of adultery, and the other of incest; on which flight ground they were both put to death in their own houses in such a manner as defervedly threw an odium on the king. His conduct was afterwards so severely condemned by certain clergymen from Jerusalem, that a reformation seems to have been produced; and no mention is afterwards made of the inquisitor or persecution during this reign.

The attention of the king was now called off from religion to the state of his affairs in the different provinces of the kingdom. As the Moorish provinces were very rich, by reason of the extensive trade they carried on, and frequently employed their wealth in exciting rebellions, it became necessary that the sovereign himself should examine into the circumstances and dispositions of the several governors; which was likewise proper on another account, that he might align to each the sun to be paid. On this occasion he divided the empire more diffusely, and increased the number of governments considerably; which being done, he left about repairing the churches throughout the country, which had fallen into decay, or been destroyed in the war with the Mahometans. So zealous was he in this respect, that having heard of the destruction of the church of the Virgin in Alexandria by fire, he instantly built another in Ethiopia, to repair the loss which Christianity might have suffered.

The last public transaction of this prince's reign was the quelling of a rebellion which some of his governors had entered into; but whatever glory he might acquire from this or any other exploit, his behaviour with regard to his domestic affairs must certainly place him in a very disadvantageous light. In the decline of the king's life, the mother of the heir apparent conceived such an extreme desire to behold her son in possession of the throne, that she began to form schemes for obliging her father to take him into partnership with him in the government. These being discovered, her husband cruelly caused her to be whipped to death; and finding that his son afterwards performed certain solemnities at her grave in token of regard for her, he caused him to be loaded with irons and banished to the top of a mountain; where he would probably have been put to death, had not the monks interfered. These having invented prophecies, dreams, and revelations, that note but the young prince Bæda Mariam was to possess the throne, the old king submitted to the decrees of heaven, and relaxed in his conduct. On the accession of the new king in 1468, the old law for imprisoning all the royal family and a mountain named Geber chosen for the purpose. Having thus secured himself from any danger of a rival in the field he should undertake a foreign expedition, he proclaimed a pardon to all those who had been banished during the former reign, and thus ingratiated himself with his people; after which he began to prepare for war. At this the neighbouring princes, particularly the king of Adel, being alarmed, sent ambassadors requesting the continuance of peace. The Abyssinian monarch told them, that his design was to destroy the Dobas, a race of Shepherds very wealthy, but extremely barbarous, professing the Pagan religion, and greatly resembling the Gallars. The reason of his commencing hostilities against them was, that they made continual inroads into his country, and committed the greatest cruelties on which account he determined not to make war as with a common enemy, but to exterminate and destroy them as a nuisance. The king of Adel was no sooner possessed of this piece of intelligence, than he communicated it to the Dobas; desiring them to fend their women and children, with their most valuable effects, into his country, till the invasion should be over. This proposal was readily embraced; but Bæda having got notice of it, seized an avenue through which they must necessarily pass, and massacred every one of the company. After this, entering their country, he committed such devastations, that they were glad to submit, and even to renounce their religion in order to free themselves from such a dreadful enemy. The king then turned his arms against Adel, where he was attended with the usual success; a most complete victory being gained over the Moors by the Abyssinian general; but while the king himself was advancing towards that country, with a full and steady resolution to reduce it to the most absolute state of misery, he was feized with a pain in his bowels, which occasioned his death.

The discovery of the kingdom of Ethiopia or Abyssinia by the Europeans took place about this time.
Covilhan arrived in Ethiopia about the year 1490; and the prince to whom he addressed himself was Alexander the son of Bæda Mariam. He seems to have been endowed with many good qualities, and no less vered in military affairs than any of his predecessors. His reign was disturbed by plots and rebellions, which at last proved fatal to him. From his early years he had manifested a great desire to make war on the king of Adel, who seems to have been the natural rival of the Ethiopian princes. But the Adelian monarch, having now become sensible that he was not able to cope with such powerful adversaries, took the most effectual way of securing himself; viz. by gaining over a party at the court of Abyssinia. In this he had now succeeded so well, that when Alexander was about to invade Adel, Za Saluce the prime minister, with many of the principal nobility, were in the intend of his adversary. Not being apprized of this treachery, however, Alex- ander entrusted this minister with the command of a great part of his forces, and with the latter abandon- ed him in the heat of an engagement. Alexander, and the few troopers that remained with him, however, were so far from being disheartened by this treachery, that they seemed to be inspired with fresh courage. The king having killed the standard-bearer of the enemy, and thus became master of the green ensign of Mahomet, the enemy began to give way; and on his killing the king of Adel's son, immediately after they quieted the field altogether. The victory was not by any means complete; neither was Alexander in a situation to pursue the advantage he had gained. Having therefore challenge the Moors to a second engagement, which they declined, he returned with a design to punish his perfidious minister Za Saluce, who had endeavoured to excite the governors of all the provinces to revolt as he went along. The traitor, however, had laid his plots too well; so that his sovereign was murdered in two days after his arrival in the capital. Za Saluce did not enjoy the rewards he expected from his treachery; for having attempted to excite a revolt in the province of Amhara, he was attacked by the nobility there; and his troops deserting him, he was taken prisoner without any resistance, his eyes were put out, and himself exiled on an afo, to the curfes and derision of the people.

Alexander was succeeded by an infant son, who reign ed only seven months; after which his younger brother Naad was chosen king by the unanimous voice of the people. He proved a wife and virtuous prince; but the late misfortunes, together with the corruption introduced at court by the Mahometans, had so unhinged the government, that it became very difficult to know how to manage matters. Judging very properly, however, that one of the most effectual methods of quieting the minds of the people would be an offer of a general pardon; he not only proclaimed this, but likewise, "That any person who should upbraid another with being a party in the misfortunes of past times, or say that he had been privy to this or that conspiracy, had received bribes from the Moors, &c. should be put to death without delay." On his entering upon government, he found it necessary to prepare ravages against an enemy whom we have not herefore men tioned, viz. Maffudi, prince of a district named Abyfi nian, which lay in the neighbourhood of Adel. This chief-
tains being a man of a very enterprising and martial disposition, and a most violent enthusiast in the Mahometan cause, had made a vow to spend 40 days annually in some part of the Abyssinian dominions during the time of Lent. For this purpose, he kept a small body of veteran troops, with whom he fell sometimes on one part, and sometimes on another of the frontiers of Ethiopia, putting to death without mercy such as made resistance, and carrying off for slaves those who made none. For 30 years he continued this practice: beginning exactly on the first day of Lent, and proceeding gradually up the country as the term advanced. His progress was greatly facilitated by the superfluation of the people themselves, who kept that fast with such rigour as almost entirely to exhaust their strength; so that Maffudi having never met with any opponent, was always sure of success, and thus came to be reckoned invincible. On the present occasion, however, he experienced a prodigious force of fortune. Naad having enjoined his soldiers to live in the same full and free manner during the fast as at any other time, and having let the example himself, marched out against his enemy; who being ignorant of the precaution he had taken, advanced with his usual confidence of success. The Abyssinian monarch, full pretending fear, as if on account of the weakness of his men, pitched his camp in very strong ground, but left some palisades open to it, that the enemy might make an attack. This was done contrary to the advice of their leader; and the consequence was, that almost every one of them was cut off. On this the king of Aden sent an embassy to solicit a continuance of the peace with himself; which was granted, upon condition that he restored all the slaves whom Maffudi had carried off in his last year's expedition; with which the Mahometan chief thought proper to comply rather than engage in such a dangerous war.

Naad having thus freed his country from the danger of any foreign invasion, applied himself to the cultivation of the arts of peace, and reforming the manners of his subjects, in which he spent the remainder of his days. He died in 1508, after a reign of 40 years, and was succeeded by his son David III, a child of 11 years of age. Though the affairs of the empire were at present in such a state as required a very prudent and active administration, the Empress Helena, widow of Bæza Mariam, had interest enough to get the crown settled on the infant just mentioned. This proceeded partly from her desire of engrossing all the power into her own hands, and partly from a wish to keep peace with Adel her native country. These ends could not be accomplished but by keeping a minor on the throne of Abyssinia, which was therefore her constant object as long as she lived. But though this might not have been attended with any very bad consequence had the two nations been left to decide the quarrel by themselves, the face of affairs was now quite changed by the interference of the Turks. That people having now conquerer almost the whole of Arabia to the Indian ocean, being likewise on the point of reducing Egypt, and having a great advantage over their adversaries in using firearms, now projected the conquest of India also. In this indeed they were always disapponted by the superior valour of the Portuguese; but as this conquest remained a favourite object with them, they did not abandon their attempts. All along the countries which they had conquered, they exacted such enormous contributions from the merchants, that vast numbers of them fled to the African side of the Red Sea, and settled on the coast of Adel. The Turks, interested at the increase of trade in this country, which they themselves had occasioned, resolved to share in the profits. For this purpose they took possession of Zeyla, a small island in the Red Sea, directly opposite to the coast of Adel; and erected a custom-house in it, where they oppressed and ruined the trade as in other places. Thus both Adel and Abyssinia were threatened with a most formidable enemy, which it would have been utterly out of their power to have resisted, had not the desire of poisleling India constantly prevented the Turks from directing their strength against these countries.

He is defeated.

David III. 113

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Abyssinia in danger from the Turks. 115

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An embassy was sent to Portugal.
In person, and in his own kingdom. This put him out of favour with the viceroy; while his attendants, displeased at the mean appearance of the man, insisted sometimes that he was a spy from the sultan, at others that he was a cook, an imposter, or a meanly-servant. Matthew, however, perceiving that he was now out of danger, maintained that his person was sacred, and insisted on being treated at the representative of a sovereign. He let the viceroy, bishop, and clergy know, that he had with him a piece of the wood of the true cross, sent as a present to the king of Portugal; and he required them, under pain of sacrilege, to pay respect to the bearer of such a precious relic, and to celebrate its arrival as a festival. This was instantly complied with, and a solemn proceeding instituted; but very little regard appears to have been paid to this ambassador either in his temporal or spiritual character, as he could not obtain leave to depart for Portugal till 1513, which was three years after he arrived in India. In his passage he was extremely ill-treated by the shipmasters with whom he failed; but of this they soon had cause to repent; as on their arrival at Lisbon they were all put in irons, and would probably have died in confinement, had not Matthew made intercession for them with the king.

In the mean time, Maffudi having recovered from the defeat given him by Naad, and formed alliances with the Turks in Arabia, had renewed his depredations on the Abyssinian territories with more success than ever. Such a number of slaves had been, by his affability, sent to Mecca, that he was honoured with a green silk standard (an emblem of the true Mahometan faith), with a tent of black velvet embroidered with gold, and his likewife was made Sheykz of Zeyla; so that, as this island was properly the key to the Abyssinian empire, he could neither be rewarded with greater honour nor profit. This happened when David had attained the age of 16; and in consequence of such surprising success, the king of Adel, never a hearty friend to Abyssinia, determined to break the peace with that empire and make an alliance with Maffudi. Having taken this resolution, the two princes invaded Abyssinia with their joint forces, and in one year carried off 19,000 Christian slaves, so that a general terror was spread over the whole empire. David, already impatient of the injuries his people had sustained, determined to raise an army, and to head it in person as his ancestors had done, contrary to the advice of the empress, who, considering only his youth and inexperience in military affairs, wished him to have employed some of his veteran officers. A very powerful army was raised, and ample supplies of all kinds were procured. With one part of his forces the emperor took the road to Auffa the capital of Adel; sending the other under the command of an officer named Betwadet, to meet the Moorish army, who were then ravaging part of Abyssinia. It was natural to be imagined, that the Moors, on hearing that an army was marching to destroy the capital of their country, would abandon the thoughts of conquest and plunder to preserve it. In doing this, David knew that they had certain defiles to pass before they could reach Adel. He ordered Betwadet therefore to allow them to enter these defiles; and before they could get through, he himself with the main body of the army, marched to attack them at the other end. Thus the Moors were completely hemmed in by a superior army; but besides this unfavourable situation, they were farther dispirited by Maffudi. That hero came, on the morning of the engagement, to the king of Adel, informing him that his person was now safe; that he had been certainly told by a prophet, long ago, that if this year (1516) he should fight the king of Abyssinia in person, he should lose his life. He was assured that the Abyssinian monarch was then present, having seen the scarlet tent which was used only by the sovereigns of that country; and therefore advised the king of Adel to make the best of his way over the left steep part of the mountain before the engagement began. The Adelian monarch, who had at any rate no great inclination to fight, was not inspired with courage by this speech; he therefore followed the advice given him; and, with a few of his friends, passed the mountain, leaving his troops to their fate. The Moors, in the mean time, being abandoned by one leader, and having another devoted to destruction, showed an uncommon backwardness to engage, which was taken notice of by their enemies. Maffudi, however, as soon as he supposed the king of Adel to be out of danger, sent a trumpet to the Abyssinian camp, with a challenge to any man of quality in the army to fight him; on condition that the party of the victorious champion should be accounted conquerors, and that the armies should immediately separate without further bloodshed. The challenge was instantly accepted by a monk named Gaetriel Andreas; who, in the reign of Baez Marim, had been condemned to lose the tip of his tongue for speaking lightly of the king's proclamation of amenity. Maffudi showed no reluctance to present himself; but received such a stroke from his antagonist with a two-handed sword as almost cut his body in two, and he immediately fell down dead. Andreas cut off his head; and throwing it at the king's feet, cried out, "There is the Goliath of the Infidels." This became the signal for a general engagement, notwithstanding the terms stipulated by Maffudi before the combat. The Moors were quickly repulsed by the king's troops, and driven backwards through the defile, defeated. At the other end they were met by the Betwadet (a), and drove those back to the king's forces; so that at last being forced to fly to the mountains, they were all slaughtered by the peasants or perished with hunger and thirst.

The same day that this victory was gained over the Zeyla Moors by David, being in the month of July 1516, the king by the island of Zeyla in the Red Sea was taken and the town Portuguese burnt by the Portuguese fleet under Lopez Suarez de Alberguia. The Abyssinian ambassador, Matthew, in the mean time, had been received with the greatest marks of esteem in Portugal. The utmost attention was paid to his embassy; he was lodged in the most splendid manner; and his maintenance was suitable to his lodging. The king prepared an embassy on his part, and sent home Matthew on board the Portuguese from the king of Portugal.

(a) This is the title of one of the officers in Abyssinia, not the proper name of a man.
A Portuguese fleet arrives on the coast of Abyssinia.

Difficult journey of the ambassadors thro' Abyssinia.

Ethiopian fleet commanded by Lopez. The ambassador ordered for Abyssinia was one Edward Galvan, a man who had filled many rate departments with the utmost applause; but who by reason of his age, being now 86, was certainly very unfit for such a difficult and perilous voyage. He died accordingly on the island of Camarán in the Red Sea, where Suarez had imprudently landed, and passed the winter in the utmost distress for want of provisions of every kind. This admiral was succeeded by Lopez de Segueyeta; who sailed first to the island of Goa in the East Indies, where he fitted out a strong fleet; after which he returned to the Red Sea, and landed on the island of Maflaas, having along with him Matthew, about the authenticity of whose mission there had been such disputes. At this first approach the inhabitants fled; but at last he was accepted by a Christian and a Moor from the continent who informed him that the coast opposite to Maflaas was part of the kingdom of Abyssinia, and that it was governed by an officer named Baharnagafi; that all the inhabitants of the island were Christians; that the raison of their flying at the sight of the Portuguese fleet was that they took them for Turks, who frequently made depredations, and ravaged the island, &c. The admiral dismissed them with presents; and soon after had a visit from the governor of Arcecko, a town on the coast; who informed him that about 24 miles from the country there was a monastery, seven of the members of which were now deputed to wait upon him. The impatiently knew Matthew, and congratulated him in the warmest manner upon his return from such a long voyage. An interview soon took place between the Baharnagafo himself and Lopez. The Abyssinian informed him that the coming of the Portuguese had been long expected, in consequence of certain ancient prophecies; and that he himself and all the officers of the emperor were ready to receive him. They parted with mutual presents; and all doubt about Matthew being now removed, he prepared to set out for the emperor's court; while Rodrigo de Lima was nominated ambassador in place of Galvan who died. Along with them were 15 Portuguese; all men of the most determined courage, and who would hesitate at nothing which they thought might contribute to the glory of their king, their own honour, or the advantage of their country. Their present journey indeed was much more perilous than their voyage from Portugal to Abyssinia. The emperor was at this time in the southern part of his dominions, but the Portuguese had landed on the northern part; so that they had almost the whole breadth of the empire to pass before they could meet with him. The very first journey they attempted was through a wood so thick that it could scarce afford a passage to either man or beast, while the intertices of the trees were so interwoven with briars and thorns of various kinds, that their passage was rendered almost impracticable. This was rendered still more terrible by the vail numbers of wild beasts they saw, and which seemed only to be prevented from devouring them by the appearance of so many men together. The rainy season was also now began; so that they were exposed to incessant deluges of water descending from the clouds, besides frequent and violent storms of wind, thunder and lightning, &c. To add to their misfortunes, an epidemic fever broke out among them, which carried off Matthew and one of the servants of Don Rodrigo. At last, after a most tedious and toilsome journey, from the 15th of April to the 18th of October 1520, the Portuguese ambassador, with his retinue, came within sight of the Abyssinian camp at the distance of about three miles. His reception was by no means favourable; for instead of being immediately admitted to the presence of the emperor, he was waited on by one of the officers of state, styled, in token of humility, Hadiq Rasr, or comman- der of eunuchs; who caused him pitch his tent three miles farther off from the camp; and it was not till five years afterwards that he was enabled to finish the business of his embassy, and obtained leave to depart for Portugal.

During all this time not a single word had passed relating to the affairs of the two nations; so that it is difficult to imagine what might have been the design of the Abyssinian emperor. At last, having resolved to send an embassy to Portugal, he allowed Rodrigo to depart, but detained two of his people, appointing Ziga Zaab, an Abyssinian monk, his ambassador to Portugal.

This long intercourse between two such distant nations, however, could not but greatly alarm the Mahometan powers, who were natural enemies to both. So that the Turkish sultan having been constantly defaced by the Portuguese in the cafl, and alarmed at the thoughts of having a fleet of that nation in the Red Sea, where they might greatly annoy his settlements on the coast of Arabia, determined to carry his arms to the African side; while the king of Adel, having strengthened himself by alliances with the Turkish officers in Arabia, was now become a much more formidable enemy than before. This was soon experienced in battle with the Adelians; in which the Abyssinian general was overthrown; and the loss of almost all his great officers and principal nobility, besides a vast number of private men. The victory was principally owing to the assistance given by the Turks; for the army was commanded by Mahomet surnamed Gragnê, i.e. left-handed, governor of Zeyla, which had now received a Turkish garrison. This man, having the conquest of Abyssinia greatly at heart, resolved, as soon as possible, to effect something decisive; and therefore having sent to Mecca all the prisoners taken in his late expedition, he obtained in return a considerable number of janizaries, with a train of portable artillery. Thus the fortune of the war was entirely decided in favour of the Adelians and Turks; the emperor was defeated in every battle, and frequently hunted from place to place like a wild beast. The Moors, finding at last no necessity for keeping up an army over-run the whole empire in small parties, every where plundering and burning the towns and villages, and carrying off the people for slaves.

This destructive war continued till the year 1537, when Gragnê sent a message to the emperor, exhorting him not to fight any longer against God, but to make peace while it was in his power, and give him his daughter in marriage; on which condition he would withdraw his army; but otherwise he would reduce his empire to such a state that it should be capable of producing nothing but grafts. David, however, still refused.
The invincible confedency with which this forlorn monarch bore his misfortunes, proved a matter of surprize both to friends and enemies. Many of his vetrician soldiers, commissariouf the difficulies of their sovereignty, stout them out in his hiding places; so that he once more found himself at the head of a small army, with which he gained some advantages that served to keep up his own spirit and that of his adherents. His greatest enemy was Ammer one of Gragné's officers, who headed the rebellious Abyssinians and who had formed a scheme of assassinating the king; but, instead of accomplishing his purpose, he himself was assassinated in 1538 by a common fowler, on what account we are not informed.

By the death of Ammer and the small success which David himself had obtained, the affairs of Abyssinia seemed to revive; but still there was no probability of their being ever brought to a fortunate issue. An embassy to Portugal was therefore thought of in good earnest, as the beneficial effects of sleeping the pressed friendship of that power were now sufficiently apparent. One of the attendants of Roderigo, named John Bermudez, who had been detained in Abyssinia, was chosen for this purpose; and to his temporal character of ambassador was added that of Abuna, primate or patriarch. John, who was not a clergyman originally, had received all the inferior ecclesiastical orders over which he was thus conferred upon him; but happening to be a great bigot to the popish religion, he would not accept of his new dignity; but with a proviso, that his ordination should be approved by the pope. This was indirectly submitting the church of Abyssinia to that of Rome; to which David would never have agreed, had it not been for the desperate situation of his affairs at that time. John was therefore allowed to do as he thought proper: when passing through Arabia and Egypt to Italy, he had his ordination confirmed by the pope; after which he set out on the business of his embassy. On his arrival at Lisbon, he was acknowledged by the king as patriarch of Alexandria, Abyssinia, and of the seas; for this last title had also been conferred upon him by his Holiness. Entering then upon the purpose of his embassy, he began by putting Zaga Zaal in iron having wafted to much time, and done nothing effectual since he had left Abyssinia. Then he presented to the king the dittresses of the Abyssinians in such a strong light, and instilled so violently for relief to them, that an order was very soon procured for 400 musketeers to be sent by Don García de Nufbe to their relief. To accelerate the progress of the intended succours, John himself proposed to sail in the same fleet with Don García; but his voyage was delayed for a whole year by fickness, occasioned, as he supposed, by poison given him by Zaga Zaal, the monk whom he had imprisoned, and who had been set at liberty by the king. After his recovery, however, he set sail for India, where he arrived in safety. The death of Don García which happened in the mean time, occasioned another delay; but at last it was resolved that Don Stephen de Gama, who had succeeded to Don Garcia, should undertake an expedition to the Red Sea, in order to burn some Turkish galleys which then lay at Suez. But intelligence having in the mean time been received of the intended voyage, these vessels had withdrawn themselves. Anchoring then in the port of Mafuah, Don Stephen set out to Arkeeko on the continent to procure fresh water and other provisions; but the Turks and Moors being entirely masters of that coast, the goods he sent in exchange were seized without any thing being given in return. A message was brought back, importing, that the king of Adel was now master of all Ethiopia, and consequently that no trade could be carried on without his leave; but if Don Stephen would make peace with him, the goods should be restored, a plentiful supply of water and all kinds of provisions granted, and amends likewise made for 60 Portuguese who had been killed at Zeyla. These had run away from the fleet on its first arrival in the Red Sea, and landed on the coast of Adel, where they could procure no water; of which the barbarians took advantage to destroy them in the country; where, having persuaded them to lay down their arms, they murdered them all. To this Don Stephen returned a smooth answer, sent more goods, obtained provisions, and promised to come ashore as soon as a Mahometan festival, which the savages were then celebrating, should be over. This treaty was carried on with equal bad faith on both sides; but Don Stephen had now the advantage by obtaining the provisions he flood in need of. These were no sooner brought on board, than the king and all his courtiers met the land; and choosing out 600 men, he attacked the town of Arkeeko, killed the governor, and sent his head to the Abyssinian court; massacring at the same time all the people in the town he met with.

During this long interval a considerable change Affairs of had taken place in the Abyssinian affairs. We have Abyssinia already seen that David had been reduced to great difficulties; but afterwards met with some little successes, which seemed to indicate an approaching change of fortune. In these, however, he was soon disappointcd.

A Mahometan chief called Pizar Magas was made Royal an attack upon the rock Gethen, where the royal family were kept; and finding it entirely unguarded, ascended without opposition, and put every person to the sword. This last disaster seems to have been Death of too great for the resolution even of this heroic David, and prince, as he died the same year 1540. He was accesis the empire of succeeded by his son Claudius, who, though then but about 15 years of age, was endowed with all the great qualities necessary for managing the affairs of the empire; in such a dreadful crisis, and had made considerable progress before the arrival of the Portugueze.

On his accession, the Moors despising his youth, instantly
The Moors defeated.

Jonathan, a rebel chief defeated and killed.

Unsuccessful attempt to affaillate Claudius.

E T H


dantly formed a league among themselves to crush him at once; but, like almost all others too confident of victory, they neglected to take the proper precautions against a surprise. This was not unobserved by Claudioes; who falling upon one party which lay next to him, gave them a total defeat. The king pursu'd them the whole day of the engagement, the enflaving night, and part of the following day; putting to death without mercy every one who fell into his hands. This exeevfive ardour very much damp'd the spirits of his enemies, and at the same time inspired his own party with the most fanguine hopes of success; whence he soon appeared at the head of such an army as convinced his enemies that he was by no means to be despifed. They now found it necessary to defert from the practice they had fo long continued of plundering and ravaging the country; to call in their scattered parties, unite their troops, and spend the rainy feaon in such parts of Abyssinia as they had conquered, without returning into Adel as had hitherto been usual with them. They now came to a resolution to force the king to a general engagement, in which they hoped to prove victorious by dint of numbers. For this purpose all the rebel chiefs in Abyssinia were called in, and a formidable army collected. They waited only for one very experienced chief named Jonathan; after which junction they determined to attack the royal army without delay. But Claudioes took his potts at all times with such judgment, that any attempt upon his camp would have been almoft deliberat'; and getting intelligence where Jonathan lay with his forces, he marched out in the night-time, came upon him quite unprepared, defeated and killed him, fending his head to the ret of the confederacy by a prifoner, the only one he had spared out of all thofe who were taken. By the fame meffenger a defiance was fent to the Moors, and many opprobrious epithets were bestowed upon them; but though the armes approached one another, and continued for feveral days under arms, the Moors were fo much intimidated that they would by no means venture an engagement.

By this victory the spirits of the Abyssinians were fo much elevated, that they flocked in from all parts to join their prince; and even many of the Mahometans, having experienced the lenity of the Christian government, choofe rather to submit to Claudioes than to the Turks and Adelians. The king, however, was in danger of being affaillate by one Ammer, a treacherous governor; who knowing that he had retied to some distance from his army to celebrate the festival of Easter, attempted to surprife him when almost deftitute of attendants; but Claudioes having timely notice of his designs, laid an ambuffh for him with a considerable part of his army which he headed in peron. The rebel, not being equally well informed, fell into the fhare, was defeated, and almoft his whole army cut off on the 24th of April 1541.

Matters were in this situation when the Portuguefe arrived, as has been already related. The head of the governor of Arkeckko had been received by the queen, who considered it as an happy instance of the favour of her allies, and as a prelodge of future victories. The Portuguefe admiral, Don Stephen de Gama, left no time in employing the men allowed by the king to affaill the Abyssinians. There were in number 450; but as the officers who commanded them were all non-commissioned men of the first rank, the army was considerably inferior by the number of their officers to the enemy. The command was given to Don Christopher de Gama, the admiral's youngest brother. Almost every man on board, however, was ambitious to share in the glory of this enterprise; whence great complaints were made by thofe who were not allowed to go; and hence Mr Bruce informs us, the bay in the island of Mafu, where the admiral's galley rode, had the name of Bahia dos Agraudos; the bay of the injured, not of the sick, as has been erroneously fupposed.

This gallant army instantly set forward by the moft easy road through the Abyssinian territories, in order to join the emperor. Still, however, the way was fo rugged, that the carriages of their artillery gave way, and they were therefore obliged to conftruct new ones to meet as they went along, splitting the barrels of old mufkets to furnish them with iron, that commodity being very rare in Abyssinia. In this journey the general was met by the empreff, attended by her two fitters and a great many others of both sexes, whom she fuffed with drums heating and colours flying, accompanied by a general discharge of the fire-arms, to their great confusion and terror. Her majesty, whole person was entirely covered, indulged the Portuguefe general with a view of her face; and after a mutual exchange of civilities, the queen returned with 100 mufketeers appointed by him as her guard. After eight days march, through a very rugged country, Don Christopher received a defiance in very infulting terms from Gragne the Mahometan general, which was returned in the fame ftyle. An engagement took place on the 25th of March 1541; in which little was done by either party besides wounding both the commanders; however, Gragne, though greatly superior in horfe bad already fo much of the Portuguefe valour, that he did not choose to venture a fccond battle.

As the feafon was now far advanced, the Portuguefe put themselves into winter-quarters; while Gragne remained in their neighbourhood, in hopes of forcing them to a battle before they could be joined by the king who advanced for the purpose as falt as poible. This being the cafe, it was to the last degree imprudent in Don Christopher to think of venturing an engagement without previously forming a junction with his royal ally; especially as Gragne had now doubled the number of his horfe, increafed his train of artillery, and after receiv'd considerable reinforcements. Unfortunately, however, the Portuguefe general suffered himself to be hurried away by the impetuoity of his own temper; and paying regard to the defiances and reproaches of a barbarian whom be ought to have despifed, was induc'd, contrary to all advice that could be given, to venture an engagement at a vast disadvantage. Yet when the armies encountered each other, the superiority of the Portuguefe was fo great, that victory seemed likely to be decided in their favour. On this Gragne order'd fome artillery to be pointed againft the Abyssinian allies. These, entirely unacquainted to fire-arms, fled almoft at the firft discharge. Gragne, well knowing that it was his interest to do so, order'd the Portuguefe, who were only 400 in number, ordered no pursit against the Abyssinians, but fell with his whole
whole force upon the Europeans. Even yet his success was doubtful, till Don Christopher, exposing himself too much, was singled out and shot through the arm. This produced such confusion, that a total defeat, with the loss of the camp, ensued; when the barbarians, according to custom, put to death all the wounded, and began to abuse the women, who had all retired into the tent of the general. This being observed by a noble Abyssinian lady married to one of the Portuguese, she set fire to some barrels of gunpowder which happened to be in the tent, and thus perished along with her ravishers.

Don Christopher, who was his ratherness, had occasioned this disaster, obstinately refused to fly, till he was put into a litter by force, and sent off along with the queen and patriarch, who happened to be present. The two latter had set off before the battle; but Don Christopher sent some horsemen in pursuit of them, by whom they were brought back, and reproached by the general for the bad example they had shown to the army. Arriving at the approach of night in a wood where there was a cave, Don Christopher entered it to have his wound dressed, but obstinately refused to proceed farther. Next day he was taken; betrayed, as is most probable, by a woman whom he loved; who is said to have pointed out this cave to him, and promised to send some friends to convey him into a place of safety. Instead of this, a party of the enemy entered the cave; and on his readily informing them of his name, they instantly carried him in triumph to Gragne. Here, after several insults had passed on both sides, the barbarian, in a fit of passion, cut off his head; which was sent to Constantinople, and his body cut in pieces and dispersed through Abyssinia.

This cruelty of Gragne proved more detrimental to his cause than a complete victory gained by the other party could have been. On the one hand, the Portuguese were so exasperated by the loss of their leader, that they were ready to embark in the most desperate undertakings, in order to revenge his death; on the other, the Turks, on whom he principally depended, were irritated to the last degree at the disappoinmtment of sharing his ransom, which they imagined would have been an immense sum; and therefore abandoned their leader to return to their own country. Gragne, thus left to decide the quarrel with his Africans, was quickly defeated by Claudius; and in another engagement which took place on the 10th of February 1743, his troops were defeated and himself killed. This last misfortune was owing to his boldness in advancing before his army which was giving way, so that he became known to the Portuguese. On this he was singled out by a Portuguese named Peter Lyon, who had been valet de chambre to Don Christopher. This man, to make his aim more sure, crept for a considerable way along the bank of a river towards the place where Gragne was; and when he came sufficiently near, shot him quite through the body. Finding himself mortally wounded, he quitted the field of battle; and was followed by Lyon, who in a short time saw him fall from his horse. He then came up to him, and cut off one of his ears, which he put in his pocket, and returned to the battle to do what further service he could. The next day Gragne's body was found by an Abyssinian officer, who cut off his head and claimed the merit of killing him; but Lyon having pulled out the ear which he carried in his pocket, vindicated his own right to the reward which was to be given to the other. On this occasion the Moorish army was almost entirely destroyed; Gragne's wife and son were taken prisoners, with Nur the son of Mugidid, who destroyed the royal family; and it had been happy for Claudius, as we shall afterwards see, that he had not these prisoners to death. Very soon after this engagement, the emperor had intelligence that Yoram, a rebel chief, who had once reduced his father David to great distress, was advancing rapidly in hopes of being still able to be present at the battle. This was the last of his fathers' enemies on whom Claudius had to revenge himself; and this was effectually done by a detachment of his army, who posted themselves in his way, fell upon him unexpectedly, and cut him in pieces with all his men.

Claudius being now freed from all apprehension of foreign enemies, began to turn his thoughts towards the repairation of the damages occasioned by such a long war, and the settlement of religious affairs. We have already mentioned, that John Bermudes was appointed by the pope, as he said, patriarch of Alexandria, Abyssinia, and of the sea. This, however, is false by others to have been a falsehood; that John was originally ordained by the ex-patriarch of Abyssinia; and that the pope did no more than give his sanction to this ordination, without adding any new one of his own. But whether this was so or not, certain it is, that John, who was very ineffectual in his behaviour, and of a turbulent disposition, now began to insist that Claudius should not only embrace the doctrines of the church of Rome, but establish that religion throughout the empire, which he had his father David had engaged to do; and which, considering the extreme distress in which he was involved, it is very probable that he did. Claudius, however, was of a different opinion, and refused to alter the religion of the country; upon which a contention began, which was not ended but by the total expulsion of the catholicks, and the cutting off all communication with Europeans. At that time the Portuguese and Abyssinians intermarried, and attended religious worship promiscuously in each other's churches; so that the two nations might have continued to live in harmony, had it not been for the misbehaviour of Bermudes. Claudius, perceiving the violence and overbearing disposition of the man, took every opportunity of showing his attachment to the Alexandrian or Greek church; deying that he had made any promise of submitting to the see of Rome. On this Bermudes told him that he was accused and excommunicated; the king in return called him a Nestorian heretic; to which Bermudes replied by calling him a liar, and threatened to return to India, and carry all the Portuguese along with him. To this insolent speech Claudius answered, that he wished indeed that Bermudes would return to India; but that he would not allow the Portuguese, nor any perfon, to leave his territories without permission.

This matters seemed likely to come to an open rupture; and there can be no doubt that the worst extremities would have followed, had not the emperor been restrained by the fear of the Portuguese valour on the one hand, if he should attempt any thing against them, and the hopes of further advantages should he retain them in his service. For these reasons he bore with patience
The Portuguese commander renounced the Roman religion.

He is invested with royal dignity.

The enterprise of the Portuguese to over his side. He succeeded perfectly with their commander Arius Dias; who privately renounced the church of Rome, and was baptized into that of Abyssinia by the name of Marcus or Março; in consequence of which, the emperor, looking upon him as a naturalized subject, sent him a standard with the Abyssinian arms to be used instead of those of Portugal. This, however, was not delivered; for a Portuguese named James Brito, meeting the page who carried it, took it from him and killed him with his sword. The apostacy of Arius is said to have been owing to the great honours which had been conferred upon him by the Abyssinian monarch; for having, in an expedition against Adel, defeated and killed the king and taken the queen prisoner, he bestowed in marriage on Arius; and that the match might be equal, he raised him also to the royal dignity, by giving him the kingdoms of Doar and Belwa.

The altercation on the subject of religion becoming every day more violent, Bermudes was prohibited by the emperor from sending any farther orders to the Portuguese, they being now under the command of Marco the Abyssinian captain-general; meaning Arius Dias to whom the name of Marco had been lately given. To this the patriarch replied, that being subjects of the king of Portugal, they were under no obligation to obey a traitor to his king and religion; and that if any plot was contrived to carry him off in retreating, submit to the pope, he was resolved to leave the empire with his forces. The emperor, however, still insisted that he was absolute in his own dominions; and he expected the Portuguese to pay obedience to his general, and none else. The Portuguese, enraged at this declaration, resolved to die sword in hand rather than submit to such terms; and therefore began to fortify their camp in case of any attack. The emperor, on this, thinking a defiance was given him in his own territories, ordered the camp to be instantly attacked. The attempt was accordingly made, but with very little success; the Portuguese, however, with much ingenuity, set fire to the Abyssinians marching along, which destroyed great numbers, and intimidated the rest to such a degree that they instantaneously fled. Finding it vain to think of reducing them by force, the emperor is then said to have been advised by Marco to consult his own safety, and break the power of the Portuguese by artifice. With this view he sent for the patriarch, pretended to be very sorry for his frequent breach of promise, and defirous to make what amends for it he could. Instead of complying with the patriarch's demands, however, he first ordered his subjects to supply them with no provisions; then stopped the mouths of the Portuguese by a considerable quantity of gold, giving the patriarch himself a very valuable present; adding to all this a large supply of provisions; but at the same time taking proper methods to disperse their leaders into different parts of the empire, so that they should find it impossible ever to reunite in a body.

Such is the account given of this transaction by the Portuguese historians; but that of Mr Bruce, who says that he translated his from the Abyssinian annals, is somewhat different. He only informs us, that the quarrel betwixt the Portuguese and Abyssinians was inflamed by the "incendiary spirit of the bratish Bermudes: Ethioappa reproves them to proceed so far, that one night the Portuguese assailed the kings tent, where they slew some and grievously wounded others." The event, however, was, that no absolute quarrel ever took place betwixt this emperor and any of the Portuguese excepting this patriarch, whom he was on the point of banishing to one of the rocks used as prisons in Abyssinia. This was dispensed with on the interposition of Gaspar de Susa the new Portuguese commander (who had succeeded Arius Dias), and another named Kasmati Robal, both of whom were in great favour with the emperor; and Bermudes persuaded to withdraw to India. According to Mr Bruce, he repaired to Dobbarwa, where he remained two years quite neglected and forlorn, saying masts to no more than ten Portuguese who had settled there after the defeat of Don Christopber. He then went to Mafuah; and the wind, now becoming favourable, he embarked in a Portuguese vessel, carrying with him the ten persons to whom he had offered as priest. From Goa he returned to Portugal, and continued there till his death. On the other hand, the Portuguese writers inform us, that he was narrowly watched by order of the emperor; and that Gaspar de Susa, the Portuguese commander, had orders to put him to death if he should attempt to make his escape. Bermudes, however, being determined at all events to make his escape, pretended to be ill of the gout, and that a change of air was necessary for his recovery; for which reason he went to the town abovementioned, where there was a monastery. On this pretence he was allowed to cross the kingdom of Tigre, accompanied by eight faithful servants, with whom he reached Dobbarwa unsuspected. Here he remained concealed in a monastery for two years before he could find an opportunity of getting to the island of Mafuah, from whence he proceeded to Goa.

The emperor was scarce freed from this troublesome priest when he was in danger of being involved in new difficulties by the intrusion of others into his dominions. The Jaina, having found the order of the Jesuits was at that time at Rome; and so much attacked at the castle of the Pope, that he proposed to go in person to Abyssinia, in order to make a thorough conversion of both prince and people. His Holiness, however, who, from what he had already seen of Ignatius, conceived that he might be of greater use to him by staying in Europe, sent in his stead Nugnez Baretto, one of the society of Jesus, whom he invested with the dignity of patriarch, and honoured with a letter to Claudia. With these commisions, and a number of priests, Baretto failed for Goa in the East Indies; by which, however, diffident, the only passage to Abyssinia was at that time. On his arrival at that place he was informed that the Abyssinian monarch had such a steady aversion to the church of Rome, that there was no probability of his meeting with a favourable reception. For this reason it was judged more proper to send some clergymen of inferior dignity, with proper credentials, as ambassadors to the emperor from the governor of India, without running the risk of having any affront put upon the patriarch. These were Oviedo bishop of Hierapolis, Carneyro bishop of Nice, and several others, who arrived safely at Mafuah in the year 1539. Claudia, on hearing of their arrival, was greatly pleased,
All these were killed after the most desperate resistance; the king himself receiving upwards of 20 wounds before he fell. His head was cut off, and brought by Nur to his mistress, who hung it up on a tree before her door. Here it remained, a lair bought by an Armenian merchant, who buried it at Antioch in the sepulchre of a faint of the same name. Nur gained on this occasion a very complete victory; the king and most of the principal nobility being killed, a great number made prisoners, and the camp taken with an immense booty. On his return to Adel, he refused to accept of any congratulations, or to allow rejoicing to be made for his victory, but passed along in the habit of a common soldier mounted on an ass; saying, that the owed the victory to the mercy of God alone, who had immediately interposed for the destruction of the Christian army.

This fatal engagement took place on the 22d of March 1555; and as the succession had been already settled, Menas ascended the throne without any opposition. On his accession he found his affairs in great shock of confusion, and he had still to contend with foreign and domestic enemies. The first of these was Radaet the king of the Jews, who had a territory in the empire of Abyssinia, the capital of which was on a rock named Sameen. The cause of this quarrel is not known, but the event was unfortunate; the king being obliged to abandon the enterprise, after having bestowed a considerable sum upon it. This was followed by an attempt to assassinate him, which had very near taken place; and this again by a conspiracy among his principal nobles headed by Isaac the Baharnaghad. He had been a Rebellion very faithful servant of the late emperor Claudius; but ill used by Menas, who was of a very haughty and morose disposition. In attempting to suppress this rebel- lion, the first attempts of the emperor were likewise inefficual, his forces being attacked by surprise and entirely defeated. Soon after this, Isaac proclaimed Tatar the nephew of Menas, who was then at liberty, king of Abyssinia; hoping thereby to strengthen his cause, and enable him to cope with the emperor, who was assembling a powerful army against him. This expedition did not answer the purpose. His army was entirely defeated by Menas; Tatar taken prisoner, and thrown headlong from the top of a precipice; and Isaac himself escaped with great difficulty to the confines of his own government in the neighbourhood of Mafah. Here he entered into an alliance with the Turkifh baith of Mafah; whose friendship he gained by putting him in pedition of the town of Dobarwa, with the flat country adjacent, which abound with the provisions wanted at Mafah, and is looked upon as one of the key to the province of Tigré and the high lands of Abyssinia. Besides this, Isaac strengthened him also by an alliance with the Portuguese; which, had their numbers been at all considerable, must have been very formidable. Their inclination to desen their former protector and ally the emperor, proceeded entirely from the shameful behaviour of their priests, who never would be satisfied without enflaving the emperor as well as his subjects to the tyranny of Rome. We have already seen that Bermudes had proceeded so far on this subject, that he narrowly escaped with his life. His Reason of succed for Ovido (for the patriarch Nunez died by the their quarrel) fared ill worse. On his introduction to the emperor,
emperor Claudius, he informed him, that the pope and king of Portugal now expected no less than an immediate fulfilment of his engagements of submission to the see of Rome. This requisition was made with such an air of insolence, that the prince could scarce conceal his resentment; but restraining his passion, he promised to consider of it, and to call meetings of the learned in these matters to debate the point. This was a very fruitless task; and therefore Ovidio thought proper to quit the court towards the end of December 1558; leaving behind him an insolent letter addressed to the Portuguese and such conversions as they had made; in which he exhorted them not to converse with schismatics, and the Abyssinians to forsake their errors. Being now debarked from access to the emperor, he began to entertain the people with facetious discourses; which practice he continued during the remaining part of the reign of Claudius and the beginning of that of Menas. The latter, perceiving the pernicious tendency of his discourses positively commanded him to desist; which the patriarch refusing, the emperor fell upon him with his own hands, beat him severely, tore his clothes and beard, and took his chalice from him that he might thus be disabled from saying masses; after which he banished him, with Francis Lopez another of his associates, to a barren mountain, where they remained seven months in great misery. Not content with this, he issued many severe edicts against the Portuguese; prohibited them from intermarrying with the Abyssinian women; and such of the Abyssinian women as were already married to Portuguese husbands, he commanded not to accompany them to their churches.

His next step was to call Ovidio again into his presence, and command him, under pain of death, instantly to leave his dominions. The insolent and foolish prelate refused obedience to this express command; and he declared that he would obey God rather than man; and presenting his bare neck to the emperor, desired him to strike and put an end to his life at once. Menas drew his sword, but was prevented by the queen and officers who stood near him from giving the fatal stroke. A second bearing and banishment to the mountain matters to debate. In the latter part of the very same year, the Portuguese prelates as well as others were included. The Portuguese, however, determined not to submit to such an indignity; and therefore, to a man, joined Isaac, who, in expectation of more auxiliaries from India, professed a great desire of embracing the Romish religion. The king was very apprehensive, and not without reason, of the arrival of more Portuguese; but it appears that Ovidio had not sufficient interest to procure the supply he promised. An engagement, therefore took place without them, in which Menas was again victorious; though the battle was not decisive as to put an end to the rebellion.

The emperor died a short time after his victory, and was succeeded in 1563 by his son Sertza Denghel, then only 12 years of age. The beginning of his reign was disturbed by new rebellions; which, however, were happily suppressed. Isaac, with his allies the bashaw and the Portuguese, seem to have remained for some time unmolested; and in the year 1569, a kind of accommodation took place. It is by no means easy to say how the Portuguese were again received into favour after such flagrant treachery and rebellion. Mr Bruce only simply tells us that "Oviedo and the Portuguese did not appear at court." This indeed is not to be wondered at, as they had been so lately at open war with the emperor. Other accounts say, that after the last battle with Isaac, their names became odious to all the Abyssinians, especially to their monarchs, that they would never suffer any of them to be in their army from that time. Some of these accounts say also, that Menas was defeated and killed in another battle; others, that he was driven to some high mountains, where he wandered about till death put an end to his misery. Accounts of this kind, however, are by Mr Bruce treated as mere falsehoods, and expressly contradictory to the annals of those times. All we can say upon the subject therefore is, that after the defeat of Isaac, the Portuguese, not excepting Ovidio himself, remained in Abyssinia, where they were more favourably dealt with by the new emperor than they had been by his father; though he was no friend to their religion, as supposing it to be defractive of morals and the state. It is probable also, that the various disturbances which happened, together with his own tender age during the beginning of his reign, would prevent him from paying that attention to them which he would otherwise have done. The Galla, a very barbarous nation, and who have at last greatly reduced the power of the Ethiopian monarchs, made frequent inroads during this reign; and in the year 1576, a league was formed by Mahomet king of Ifaac and Adel, with Isaac and the Turkish bashaw, who had either continued their hostilities, or renewed them about this time. The emperor, however, marched with such expedition, that he did not allow them time to join their forces; and attacking them separately, gained a complete victory over them all. Almost the whole Moorish army was destroyed; but while the emperor entered Adel with a design to make a full end of his enemies on the coast, he received information that the Galla had invaded him on the coast. Travelling the whole breadth of the empire therefore with the utmost expedition, he came up with these enemies, who were afraid to encounter him. On this he turned his arms again from the Galla, and obliged them to leave the country of the bashaw king, whom he banished to a mountain. Then invading the country of the Galla and Falasha, he ravaged it for four years successively, protecting at the same time the kingdom of Narea from the inroads of these barbarians. While Sertza Denghel employed himself in reprefencing the incursions of the Galla, one Cadward Bashaw, a Turkish officer of great valour and experience, who had been invested with the office of bashaw of Mafah, began to make inroads into the province of Tigre. The emperor hastened to oppose him; but in his passage committed great devastations in the country of the Falasha, in order to provoke them to descend from their mountains and come to an engagement. These Falasha profess the Jewish religion, and were then overruled by a king named Gefhen. This monarch, provoked at the ravages and destruction he beheld, descended with vast numbers of his subjects, in order to revenge it; but was killed, and his army utterly defeated by the Abyssinians, on the 19th of January 1594. The victorious Sertza then hastened to encounter the bashaw; who, confident of the superiority of his own
The battle of the Bahaw dhsaw defeated and killed.

The death of the emperor.

Two successor nominated.

Jacob raised to the throne.

The empire of Ethiopia.

The conquest of the kingdom of Nares. The conquerors, alarmed at this bold exertion of royal pretension, determined instantly to depose Jacob, and raise Za Denghel, whom they had banished to the throne. This, however, was now a matter of some difficulty; as he had concealed himself so effectually among the mountains of Gojam, that he could scarce be found out. His retreat being at last discovered, Ras Athanasius took an opportunity of inflicting Jacob, even while sitting on the throne; called him an obstinate, stubborn, and foolish boy; declared him degraded from the imperial dignity, and that Za Denghel was coming to supplant him. Jacob, perceiving by the insinuation of this speech, that he was entirely in the power of his enemies, left his palace in the night, in order to fly to the mountains of Samen, where his mother’s relations were, from whom he expected protection. He got to the borders of that country, but was there discovered, seized, and brought back to his rival, who was now seated on the throne. Za Denghel, however, with a Jacob bas-

clemency not very usual in Abyssinia, did not either

put him to death, or mutilate him in such a manner

as to render him incapable of afterwards enjoying the kingdom; but contented himself with banishing him

for life to Nares.

Za Denghel was no sooner settled on the throne,

than he un luckily behaved in such a manner as to alienate the affections of his people from him entirely.

This was occasioned by his attachment to the church of Rome. Ever since the time that the Portuguese had

defied the Emperor, the entrance into Abyssinia had been shut up by the Turks, so that no new millionaires could have access; and all those who came with Oviedo being dead, the Roman religion had languished for want of preachers to support it. The last of these died in 1596; and all the rest having been dead for some time before, little could be expected from the labours of a single perf son. Next year Melchior Sylvanus, a vicar of the church at Goa, was sent on a mission to Abyssinia; being supposed to be a proper perf son for this work, on account of his language and complexion, which might baffle the vigilance of the Turks. He entered without being suspected; but the great defeat given the Turks by Sertzha Denghel already mentioned, had reduced their power so much, that lest danger now attended this expedition than formerly, and other missionaries quickly followed.

The most learned, as well as being most needed for the understanding in every respect, was Peter Paes, who restores it came to this country in the year 1600; and on his taking upon him the whole charge of the mission, Sylvanus returned to India. The new missionary did not at first affect to intrude himself on the emperor; but taking up his residence at the convent of Fremond in the province of Tigre, he at first applied to the study of the learned language of the Abyssinians called Geez, and in which their books are usually written. In this he made such progress as quickly to for prise the natives themselves; after which he set up a school, where the children of the Portuguese and Abyssinians were taught promulnously. The progress made by his scholars was so great, that he was spoken of at court, and recommended in the warmest terms to the emperor Jacob before his deposition. On this he was sent for, and appears before the court in 1604; where, to
The great dissatisfaction of the Abyssinian monks, he received such honours as are usually bestowed on men of the first quality. Next day, in a dispute before the king, two of his scholars, whom he had brought along with him, fairly vanquished the best theologians that could be found to oppose them. Mass was then said in the Roman manner; and this was followed by a sermon, which in the purity and elegance of its delivery (whatever the substance might be) excelled anything that had ever been composed in the Abyssinian language.

Though Paz engaged to court by Jacob, yet Za Denghel was on the throne before he arrived, and it was he who witnessed the dispute and heard the sermon. He was so much charmed with the latter, that he instantly resolved to embrace the religion of the church of Rome; which resolution he soon after communicated to several of his friends, and even to Paz himself; but under an oath of secrecy. The emperor’s own zeal, however, rendered this oath of no use; for in a little time, he lifted proclamations forbidding the observation of the Jewish Sabbath, and wrote letters to Pope Clement VIII. and Philip III. of Spain, defiring a supply of mechanisms to instruct his people in the useful arts, and Jesuits to teach them religion.

This precipitate conduct had the effect which might have been expected. The Abyssinians were generally disaffected to the church of Rome, and no pains had been taken to gain them over: they were also turbulent, savage, and rebellious; ever ready to revolt; and now had a favourable opportunity of excusing their treacherous pretence of zeal for religion. This opportunity was quickly made use of by Za Selaffe, whom, as we have already mentioned, Jacob had benighted, but who, on the advancement of Za Denghel, had probably still more been set at liberty. This traitor having first held many conciliatory meetings in private, prevailed on the Abuna, or Abyssinian patriarch, to excommuni cate the king, and abdicate his subjects from their allegiance. He then set out for the territory of Gojam, where the people had always been remarkable for their veneration to the church of Rome. In this place, therefore, he found no difficulty in raising an army to fight against his sovereign. Za Denghel, an experienced officer, who did not fail to go in quest of him with what forces he could raise; but soon found, by the great defection among his troops as he passed along, how much the excommunication pronounced by the Abuna had availed. This was so alarming, that John Gabriel, an experienced Portuguese officer, advised him to decline an engagement for the present, and take shelter in some for ®rists until his subjects should return to a sense of their duty. This salutary advice was rejected, from the absurd notion that it was a dishonour not to fight a rebel who had defied his sovereign. In the beginning of the engagement, victory seemed to favour the royal cause. The Portuguese carried every thing before them, and routed that wing of the enemy which opposed them. In the other wing, however, the cowardly and treacherous Abyssinians deserted their king, who was quickly surrounded by his enemies, and left in a desperate situation. A body of nobility, with his own officers and domestics, attended him and fought desperately in his defence. Za Denghel himself, being an excellent horseman, and admi

rably skilful in the use of arms, performed astonishing feats of valour. At last he was thrown to the ground, grievously wounded in the breast by a lance. Notwithstanding this, he instantly recovered himself, drew his sword, and reftored his adherents to violence, that they were safe to keep at a distance and annoy him with missiles weapons. In this situation he stood still almost fainting with fatigue and loss of blood; when the traitor Za Selaffe, pushing on his horse violently against him, threw him to the ground by a blow on the forehead, and a multitude running upon him was dispatched with many wounds.

The news of Za Denghel’s death were received with the greatest general indignation throughout the Abyssinian empire, that the rebels durst not name any successor. As it seemed natural to think however, that Jacob would now be re-elected, messengers were despatched to acquaint him of his good fortune; but during this interval Socinios appeared, not as a candidate, but as ready to defend the interests of the emperor, and ready to support his rights by force of arms. His first step was to let Ras Athanasius know his pretensions to the throne, and declare his independence with his army, professing to reward him as soon as it should be in his power. Without waiting for any answer, he advanced so rapidly, that Athanasius had scarce time to consider what he should reply, when a second message was sent, importing that Socinios was in the neighbourhood, and ordering preparations to be made for receiving him as his sovereign. These expeditions were made to so much confound Athanasius, that he complied with the requisitions, saluting him king, and joining his troops to his. Thus successful in his first attempt, Socinios made a similar one on Za Selaffe. In this, however, he was disappointed. Za Selaffe having first sent an equivocal answer, marched against him with his whole army; while Socinios, happening to fall sick, and putting little confidence in Athanasius, withdrew to the mountains of Ambara. He is obliged to retire.

Za Selaffe had refused to join Socinios, in expectation that Jacob would make his appearance, whom he rather wished to enjoy the crown than Socinios; as under the former he might hope to engross all the power to himself. For a long time, however, no answer was returned to his messages; his troops became impatient; so that fearing left a mutiny or general defection would take place, he despatched a messenger to Socinios, acknowledging him for emperor. But scarce up in opposition was this done, when a messenger arrived from Jacob, informing him that he was then in Dembea, and pronouncing Za Selaffe great honours if he would acknowledge him for his sovereign. With these terms the traitor instantly complied, and his example was followed by Athanasius; while Socinios, still as yet able to reft all his enemies, retired again to Ambara. This however, he was not long of accomplishing. Jacob was by no means possessed of equal military skill; and though Za Selaffe was an experienced officer, yet his extreme perfidy, pride, and obstinacy, rendered it very dangerous to have any concern with him. This appeared remarkably in the present case. His pride in Za Selaffe the first place would not allow him to join his forces Jacob’s go to those of Jacob, left the latter, who was inferior in num
The king, therefore, ordered the territories policed by the Jesuits at Fre-
mona; after which he declared to Paez his resolution of embracing the Catholic religion; giving him at the same time two letters, one to the king of Portugal, the other to the Pope, the purport of which was to request a number of more Portuguese to deliver Abyssinia from the incursions of the Gallas, as they had formerly done from the yoke of the Moors.

Before any thing of importance could be done in matters of religion, the king was called forth to sup-
pport a rebellion, which had already taken place. An impof-
tor, pretending to be the late emperor, Jacob ap-
pears. He made his appearance among the mountains of Habab near Mafuah; and being joined by great numbers of people, Sela Christos, brother to the king, and governor of Tigre, marched against him. The defeated:
impositor's troops, though numerous, fled at the first onet: but he escaped to the mountains, where it was very difficult to follow him. This, however, was attempted; and a great many of the posts he had taken were formed like as many forts; but fill the impostor, himself, though driven from place to place, found means to make good his retreat to the country lying between the mountains of Habab and the territory of the Baharnagh. Thither he was pursu'd by Selah Christos: but that general, finding the rebellion likely to spread through the whole province of Tigre, thought proper now to acquaint his brother Socinios with the state of affairs, and to define his assistance. The king, though at that time he had sent away most of his troops in an expedition against the Shangalla and Gongsas, who dwell on the north-west of Abyssinia, for out immediately with such troops as he could collect. These were but few in number; his cavalry particularly, amounting to no more than 330, besides a small reinforcement brought by his brother Emana Christos, governor of Amhara. As he proceeded, he was informed that a party of Gallas were loded on a hill at no great distance from him. Determining to cut them off, he surrounded the hill where they were posted, but having cas'd his cavalry to advance before, and pass a deep ravine, they were almost entirely destroy-
ed, while the rest of the army were feized with such a panic that they refused to follow. In this extreme danger, the Gallas apased the ravine to attack them; but the king having advanced singly, and killed the first of them, his troops, abashed of their cowardice, rushed forward on the enemy, and gained a complete victory, which obliged the savages to leave the province they infested at that time.

The misfortune of the cavalry on this occasion quickly occasioned a report that the king had been defeated; of which the impostor Jacob did not fail to take advantage; and defending from his mountains, committed great devastations in the low country. But the impostor Jacob, though attended by a great multitude, who likewise fought with more obstinacy than formerly, he was again de-
defeated by Sela Christos with a force greatly inferior to his.
But before any thing effectual could be done for his reduction, the Galla made a dreadful inroad into the province, murdering all who fell into their hands, and burning towns, and destroying churches, and villages, in the most dreadful manner. The king bore himself so far as time with patience, till at last he drew them into such a disadvantageous situation, that being surrouned by his forces, and inferior in number as well as in value, they were all cut off to a man, with the loss of only 400 on the part of the Abyssinians. Soon after this victory the king underwent the ceremony of coronation. He then marched against the impotent Jacob; but the latter was too feeile of the superiority of his rival to face him in the field. He therefore retired again to his mountains, while the king left the suppression of the rebellion to an experienced officer named Amala Christos; who employed two young men, that had been outlawed for murder, to affassinate the impot- tor. This being done, it was found that the pretended Jacob was no other than a heresian among those mountains to which he so constantly fled for refuge; and that he had neither wound nor scar on his face, but had kept one half of it covered to conceal the little resemblance he bore to Jacob whom he personated.

The king being now freed from this rebellion, began again to turn his thoughts towards religion. His first step was to make an handsome present to the Jesuits; but he soon showed his inexperience in religious mat- ters, by attempting to reconcile the two contending part- ties in his empire. Before he could see the folly of this attempt, however, his attention was called by a most dangerous rebellion, which was begun by one Melchi- zedec, a servant of the late Sertza Dengel, but a man of great experience in war. He was first op- posed by Sanuda, a brave officer; but being totally de- ftitute of troops, he was obliged to apply to the at- tendants of the king of Sennar, who had been de- posed by his subjects, and was at that time in Aby- sinia. There he readily joined him; and a bloody whirling, in which Sanuda was so totally defeated, that he alone had the good fortune to escape, and that griev- ously wounded, his men being all killed on the spot.

On this misfortune Socinios sent his brother Emana Christos with a considerable force to reduce the rebels. Melchizedec finding himself opposed by such an able general exerted himself to the utmost, in order to raise a force sufficient to resist him; and in this he succeeded to well, that his army soon struck terror into all the neighbouring country, notwithstanding the pre- sence and known value of the king's brother. A prince of the blood-royal named Arash, was likewise found out and proclaimed king, in order to give some fan- cion to the rebels; soon after which they boldly marched to meet the royal army. The engagement took place on the 9th of March 1611, and was fought with great obstinacy. On both sides: the advantage even appeared for some time on that of the rebels; till Emana Christos, perceiving that all was at stake, pushed desperately forward to the place where Melchi- zedec himself was. The latter seeing no probability of avoiding a single combat, which he did not choose to try, instantly turned his horse and fled; and the rest of the army soon followed his example. Melchizedec, however, did not much avail himself of this coward- dice; for he was closely pursued by the peasants, taken prisoner, and executed as a traitor, together with fe- veral of his principal officers. The fate of Prince Ar- pnnce, to support their cause, the rebels had pro- claimed, is not known.

This victory, so far from extinguishing the spirit of rebellion, seemed to have inflamed it beyond all bounds: for news were now received that the whole country round the head of the Nile to the province of Higre had revolted; so that there was a necessity for the immediate presence of the emperor himself; and even this was insufficient, as the rebels were dispersed over such a large tract of territory. His two brothers, Emana and Sela Christos, were therefore both em- ployed against different rebel chiefs, while the king marched against those who were most formidable. The principle on which this war was carried on seems to have been very cruel, viz. that of killing all the men, and carrying off the women and children for slaves.

This was punitively executed, first upon the inhabi- tants of a mountainous district named Gufman on the Nile; though at the intercession of the missionary Peter Paez, the women and children, instead of being sold for slaves, were given to the Jesuits to be educated in the Catholic religion. The Gongs and Agows were next attacked with equal success and still greater cruelty: one of their tribes, named Zulaloboa, being almost entirely exterminated: but this, instead of having any good effect, seemed to multiply the rebels still more. The Agows and Galla invaded the provinces in the neigh- borhood; and another impostor, whose true name was Anndo, but who pretended to be the unfortu- nate emperor Jacob, appeared as a competitor for the crown. This last rebel proved much more formi- 272

able than any of the rest. He was indeed surprized before he had time to collect any forces; but Gideon, king of the Jews of Samaen, having killed the guards who watched him, set the impostor at liberty, and supported his cause. Thus he soon collected a very formidable army, with which he defeated and killed an officer named Atram, who opposed him with a confi- derable force. This brought Socinios himself against him, who instantly attacked the Jewish monarch Gide- on, as being the principal support of his cause. As War with the country of the Jews was naturally strong, and very full of fortified places, the reduction of it was evidently a very difficult task. The first place attacked was a for- tress, named Mussraba; which, though very strongly fortified and garrisoned, was soon taken: by storm, and every one in it put to the sword without distinction. Houchi and Ambo Za Haucassu two other strong for- tresses, shared the same fate. A fourth, named Sengn- nat, no less strong than any of the former, was also taken; Gideon himself narrowly escaping with his life in the attack. Difcouraged therefore by so many mis- fortunes, and apprehending the total ruin of his coun- try, this prince at last was content to flee for peace; which was granted on condition that Anndo should be deliv- ered up. This traitor was condemned to a pu- nishment very atunul among Christians, viz. that of being crucified; but in nailing him to the cross, his arms and feet were broken; the same, however, did not much avail himself of this coward- dice; for he was closely pursued by the peasants, taken prisoner, and executed as a traitor, together with fe- veral of his principal officers. The fate of Prince Ar- pnnce, to support their cause, the rebels had pro- claimed, is not known.

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In 1616, the emperor set out on an expedition against the Galla; but this was laid aside on the death of his eldest son, for whom he entertained a great affection. It was succeeded by a very cruel order against the Jews, whom Socinios new determined to exterminate without any apparent occasion. His commands, however, were executed with the utmost punctuality; so that very few escaped; and among the rest perished his prince Gideon lately mentioned. He was supposed to be immeasurably rich, and to have concealed his riches which have been found for in vain by the Abyssinians from that time to the present. The children of the murdered Jews were sold for slaves; and such of the professed as were scattered through the empire, had orders to renounce their religion and be baptized, under pain of death. Thus almost the whole Jewish religion was extinguished at once, as most of them chose rather to embrace Christianity than suffer death. In token of the sincerity of their conversion, they were all ordered to plough and harrow on the sabbath day.

This butchery being over, the expedition against the Galla was resumed; and carried on with the usual cruelty; while the Galla never once appeared to prevent the defolation of their country. Next year, however, a new association was made among these vagabonds, and the empire invaded by them in two different parts at once. One of their armies was cut off to a man before they had time to begin their ravages; while the other fled on the first approach of the royal army, leaving their wives, children, and baggage, to the mercy of the enemy. Thus the king was left for a short time at rest from rebellions or foreign invasions; and this interval he determined to make use of in making war on his neighbour the king of Senaar, from whom he had formerly received an affront. In this expedition he was assisted by one Wed Ageeb, a prince of the Arabs, who lived on the frontiers of Abyssinia. The allies proceeded with their usual cruelty, killing all the men, and selling the women and children for slaves. vast numbers of cattle were carried off; and the victorious armies returned with an immense booty. The next expedition was against Fatima queen of the Shepherds, otherwise called queen of the Greeks, who resided on the north coast of Abbara. In this also the king proved successful, though less blood was shed than usual; but it was not long before this extraordinary success met with a severe check by the entire loss of an Abyssinian army; the favourite son of the emperor himself being killed in the engagement, with some of the best officers in the empire.

All this time Peter Paez had applied himself with the utmost affinity to the conversion of the Abyssinians to the Catholic faith; and in this undertaking he had been attended with wonderful success. He was indeed of all others the most fit for an undertaking of this kind among a rude and barbarous people. Besides an uncommon share of learning, he possessed an eminent degree of skill in the mechanical arts; by which he was enabled to teach the Abyssinians how to build huts of stone and lime, which they had never known before. In these he was at first master, carpenter, painter, and architect, himself; and thus, to the magnificence of the whole empire, he built immense churches and a palace for the king. His universal genius prepared the people for the reception of his opinions; while the barbarous ignorance and savage manners of his antagonists tended to prejudice every one against their tenets, though ever so just in themselves. Sela Chritos, the king's brother, is said to have been converted by only reading the Abyssinian books with attention; in which it seems the ignorance of the priests had been displayed in an extraordinary manner. We have already seen how well the emperor himself was inspired towards the Romish church; and his example was followed by many of the principal people of the kingdom. At last the Abyssinian patriarch named Simon made a complaint, that irregularities in religion had been committed; and disputes held on matters of faith without calling him, or permission granted him, to support his clergy in these controversies. As Socinios had no opinion of this priest's learning or eloquence, he did not imagine that any harm could ensue to the cause from granting what he wanted. A public dis pense was accordingly appointed; in which Simon's inferiority was so apparent, that Socinios now publicly declared his belief in the two natures of Christ.

While the conversion was in this prosperous way, letters arrived from the pope and king of Spain, but without any promise of the temporal assistance, viz. the soldiers he had solicited; though they afforded him of an ally far superior, the Holy Spirit himself, provided the emperor continued firm in his resolutions of embracing the Catholic faith. Socinios would probably have been as well satisfied with an account of a reinforcement of soldiers; but as matters stood, he was determined to be content; and resolved to submit to the pope, renouncing for ever his connection with the Greek Church. As it was improper, however, to send letters on a subject of such importance by a common messenger, proper persons were to be appointed who might occasionally assume the character of ambassadors, and act accordingly. This being resolved on, the next thing was to determine the way by which the ambassadors were to reach Europe. The usual track by Mafiah was now shut up on account of the rebellion which existed in the neighbouring provinces; so that the more eligible way seemed to be through Narae and the provinces to the southward, by which they might reach Melinda, and thence embark for Goa.

The ambassadors were chosen by lot; which falling first on Antonio Fernandez, he was named for his expenses as his companion; and, all things being settled, these two set out for Gujam in the beginning of March 1613. It seems surprising that the Abyssinian monarch should have sent these ambassadors on such a dangerous expedition without a proper guard through the.
Account of their journey.

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Pope travellers, ()thenver.river as J)efcrip~ description of the river Zebee.

224 hollages for javelins were also granted, but this force was undoubtedly too small to answer any useful purpose. Sela Christos indeed furnished them with guides from the barbarous nations in the neighbourhood of Narea, taking hostages for the security of the travellers; but the insufficient of these precautions soon appeared. Our travellers had proceeded but two days journey into the country of the Gogas, when they were treated in such a hostile manner, that one of the Portuguese was obliged to return with Fernandez to complain of the behaviour of the savages. On this information Sela Christos at last dispatched three officers, with a proper number of troops to chastise them; by which means the ambassadors got safe to Mine, the name of some miserable villages on a ford of the Nile. Here the river overflowed the ford, and two days after, the day entered the country of the Pagan Gall; and just after, though not without great difficulty, they reached the kingdom of Narea, the most southerly province of the Abyssinian empire, but quite surrounded by the Gallas. Here they were received with great kindness by the commanding officer of the first fortified place they came to; but on being introduced to the king himself, they met with a very indifferent reception. This was owing to the intemperance of an Abyssinian Monk, that they were to bring Portuguese soldiers that way into Abyssinia; which would be destructive to his kingdom. On calling a council, it was resolved to send them into the kingdom of Bali; so that they would be obliged to pass through a much more difficult and dangerous road than what was first intended. Having thus, as he supposed, provided against the danger which threatened his kingdom, he made them a present of 50 pieces of gold, recommending them at the same time to the ambassador from the sovereign of Gingga, thr' which they were next to pass.

On leaving Narea, they received a convoy of 80 soldiers to conduct them safely to their next stage; over which they passed four days through country totally laid waste by the Gallas, and where they were obliged to hide themselves for fear of meeting with these savages. Proceeding still through woods and vast chains of mountains, they came to the river Zebee, or more properly Kibbee, from its white colour resembling melted butter, as the word imports. Fernandez described this river as larger than the Nile, and vastly more rapid. They passed it by a kind of bridge, but certainly a most tremendous one. The channel of the river is full of rocks; and between every two of these a single tree was laid, so elastic that it would bend with the weight of one person; while the vast height of the precipice, and the height of the rearing current below, was sufficient to strike the boldest with terror. At a small distance from this bridge was a ford, through which it was necessary that their mules should pass; which being accomplished without any accident, though with difficulty and danger, they entered the territory of Gingga. Here they were hospitably received by the sovereign, and after a mutual exchange of presents proceeded to San-gara, the capital of another small kingdom named Canubet, which was at this time governed by a Moor named Anzalul. During the time of their residence here, one Manquer, a schismatic Abyssinian, arrived, who intimated to the king that the recommendations they had brought along with them were false. This reduced them to the necessity of paying there till messengers could be sent to Socinios to know whether it was so or not; which occupied a delay of three months. At last orders were brought to send them off immediately. This favourable answer procured the diffusion of the ambassador with presents; while the malicious Manquer was detained prisoner. He escaped, however, and overtook them in the next kingdom, named Ababa, which was governed by a Moor named Dikko. Here he accused them of a design to overturn the Mahometan religion altogether: which so exasperated the barbarian, that he threatened them all with death; and actually put them in prison, where some of the Portuguese died. At last, after holding a council in which Manquer gave his voice for putting them to death, it was resolved that they should be sent back to Amelmal; which was accordingly done, obliged to and from his dominions they returned to Abyssinia. Thus ended this memorable embassy, by which the Pope was deprived of any authentic documents which might show than any Abyssinian emperor had ever voluntarily submitted to him; and there can be no doubt that this miscarriage, more than any thing else, prevented the establishment of Popery in this country.

Socinios had now gone so far in favour of the Catholic party, that he began to share in some measure in the fate of Za Denghel, numberless conspiracies being formed against him; which it was undoubtedly owing only to the altered situation of the preaching and afinity of Peter Pacz, that he was able to withstand. The conspirators were at this time supported, not only by the Abuna, but by Emanza Christos himself, the king's brother, whom we have frequently had occasion to mention. Their first step was the very same which had been so successfully taken by Za Selaffe in the time of Za Denghel, viz. to pronounce sentence of excommunication on the emperor. He was at that time absent on an expedition against the Agows; but when he returned immediately on hearing what was reported in his absence; informing the Abuna, that if he did not recall the excommunication without delay, his head should pay the forfeit. This spirited declaration had such an effect, that the Anathema was annulled, and the his sentence conspiracy dissolved for that time. It was next refused between Emanza Christos the king's brother, Julius his son-in-law, and Keifa Wahab master of the household, to assassinate the king in his palace. To accomplish this purpose it was concerted that they should defile an audience; that Julius should enter first, and present a petition of such a nature as would probably be refused; on this he was to begin an altercation; and during the continuance of it the other two assassins were to come up, and stab their sovereign before he had time to put himself in a posture of defence.

Happily for Socinios, however, he was informed of his danger by a page just before Julius made his appearance: on which, instead of refusing the petition, he granted it immediately; so that there was no room for dispute. He then got up to walk; which was scarce
It made a violent irruption into Foltmn.

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Socinios alarmed at thefe

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The emperor's lious fpirit when the king was abfent on an expedition againfi Julius

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Julius the emperor's fon-in-law first appears in arms.

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camp was immense, Julius having brought all his rich-

es, which he am musted by a long course of exa.1t10n,

into the field along with him; and all of these were

distributed among the foldiers. A vaft number of
cattle were likewise taken, which Socinios distributed

among the priests, judges, and lay-officers. By this

complete victory the whole scheme of the conspira-

tors was overthrown. Emana Chriftos having no forces

capable of coping with his brother, and unwilling, as Chriftos

we have faid, to affift Julius openly, had retired to a taken, but

high mountain named Melca Amba, in the territory of pardon-

Gojam. Here he was inveiljet by Af Chriftos, an ex-

perienced general, whom Sela Chriftos had left govern-

or when he joined the emperor. Emana, who was

likewise an expert commander, would have made a vi-

gorous defence; but unfortunately the mountain was

so deftitute of water, that in three days he was deliv-

ered up by his own men to fave themselves from pe-

rithing with fhrift. On being brought to the king, he

was tried in a full afsemble of judges, and condemned
to death; but the king pardoned and sent him to Am-

hara.

This terrible conspiracy had been occasioned by the difpute concerning the two natures of our Saviour: another quickly followed on account of the dif-

pute concerning the Sabbath-day; the Abyssinian

church infiftling on the obervation of the feventh day

of the week as a Sabbath, and the Romish church on

the obervation of the first day. The author of this

rebellion was one Jonael, who had been concerned in

the expedition formerly mentioned, in which the A-
gow's cattle were driven away, and afterwards restored

by the king. It is more than probable that his re-
fentment on this account contributed much to increafe

his zeal on the prefent occasion; but whatever was the

real caufe, religion was the fole pretence. He began

with a moft influent and anonymous letter to the

king; in which the arguments of the Alexandrians for

the obervation of the Jewifh Sabbath were flated, and

the contrary doctrine condemned with the utmost

vivulence of exprufion. The king himfelf was revived

in the moft opprobrious manner, compared to another

Dioclefian, the Jefuits faid to be relations of Pontius

Pilate, and all of them devoted to hell without re-

demption. By this fapid performance the king was

fo much offended, that he added a clause to the for-

mer proclamation, commanding that all out-door work,

fuch as ploughing and fowing, fhould be publicly

followed by the husbandman on the Saturday, under

the penalty of paying a web of cotton-cloth for the firft

omiffion, the value of the cloth to be 5s.; the sec-

ond offence to be punifhed by a conftitution of move-

ables, and the offence not to be pardoncd for seven

years." To this Socinios added a speech from the

throne in vindication of himfelf, concerning the part

he had taken in religious matters; and to fhew that he

was in earnest, caufed the tongue of a monk to be

cut out for denying the two natures of Chrift, and one

of his generals to be whipt for obferving the Jewifh

Sabbath.

In the mean time Jonael having collected what for-

ces he could, openly declared againfl his sovereign; but

not daring to meet him in the field, he retired in-

to the country of the Galla, on hearing that Socinios

was approaching him with an army. On this the king
entered their territories, and laid them waste; which created a sensation among the savages themselves; one party being for affording him protection, the other for delivering him up. This being made known to the king, he sent a few presents to the faithless barbarians of Jonael's party; who returned his kindness by sending him the head of the rebel, though but a short time before they had fought with their brethren for his rescue.

A more formidable enemy than Jonael, however, still remained. The province of Damot was one of the most disliked to Socinios in the whole empire; and to this place the greatest part of the religious fanatics in other provinces had retired. They now mustered up an army of more than 12,000 men, among whom were 400 monks, all of them armed with shields, lances, and swords; inspired, besides, with such a degree of religious enthusiasm, that they expected to be rendered invulnerable by all terrestrial weapons, and that armies of angels would fight in their behalf. In this way the emperor was dispirited, and an engagement became unavoidable. The number of the rebels, however, were not allowed to approach, so that an engagement became unavoidable. The number of the rebels, however, were not allowed to approach, so that an engagement became unavoidable. The number of the rebels, however, were not allowed to approach, so that an engagement became unavoidable.

The emperor, having once more vanquished his enemies, now determined to show his attachment to the church of Rome more openly. Having therefore sent for Peter Paez, he told him his final resolution to embrace the Catholic religion in its full extent; after which he renounced the Alexandrian church in the most explicit manner. His renunciation was followed by a proclamation vindicating his conduct; in which, besides the arguments used for the Pope's supremacy, &c. he insinuated much on the bad lives of the clergy of the opposite party, and for which it appeared that there was in reality too much foundation. This was the last work of the excellent missionary Peter Paez, who died of a fever immediately after his leaving the king. The example of the sovereign, however, had very little effect upon his subjects. The proclamation was followed by a new rebellion in Amhara. Unluckily the enemies of his brother Sela Chirifos had prevailed Socinios to deprive him of his government; and there was no other in the kingdom who could be enticed with such an important commission; so that the king soon found himself under a necessity of replacing and committing to him the charge of the war against the rebels. In this he was attended with his usual success: for the rebel chief, finding himself unable to contend with his enemy, repaired for assistance to the Galla; who no sooner had him in their power than they killed him on the first offer of the imperial general, mangling his body in such a manner that a bit of it remained to be sent to his antagonist.

In the mean time news of the revolution in religious matters which had taken place in Abyssinia, arrived in Europe. Though the embassy to the Pope, and king of Spain could not pass, as has already been related, yet frequent accounts had been otherwise transmitted; which produced such an effect, that a new army was sent in effect of missionaries, with a patriarch (Alphons Mendez) at their head, sent to Abyssinia. They arrived at Gorgera, the seat of royal residence, in the beginning of the year 1626; and at the very first audience of the emperor, it was agreed that he should take an oath of submission to the Pope. The ceremony was performed with all the splendor that could be contrived; the patriarch then preached a sermon on the Pope's supremacy in the Portuguese language, intermixed with Latin quotations, which is reported to have greatly satisfied the faith of the emperor and his brothers, though neither of them understood a word of the languages in which it was preached. An answer to this unintelligible discourse was made in the Amharic language, which was equally unintelligible to the patriarch and his attendants; and to this the patriarch added a few words of a reply equally ill understood. At the conclusion of the dispute, an oath of the Pope's supremacy was taken by the emperor himself on his knees, then by the princes, and afterwards by all present, according to their different stations. Sela Chirifos, not contented with taking the oath, drew his conduct of sword, and in words not easily understood, denounced vengeance on 'those who fell from their duty,' and he likewise added to the oath of supremacy another to the emperor and Facilidas the Prince Royal; but if the latter should fail in the defence of the Catholic faith, he swore to be his greatest enemy: nor would he be satisfied without imposing this clause upon all the officers, whether civil or military, then present.

This violent conduct of Sela Chirifos procured him a number of enemies, and at last was the occasion of his destruction; but that of the king and patriarch put the whole empire in a flame. An excommunication was first pronounced upon all who did not keep the oath: a proclamation was next issued, that all priests should previously embrace the Catholic religion under pain of death; and that every one, under the same penalty, should observe Lent and fast according to the rules of the Romish church. The patriarch proceeded in the same style: re-ordinning the clergy, confederating the churches over again, re-baptizing the people, even such as were fully grown, abrogating circumcision, polygamy, and divorce (which there had been allowed by the Alexandrian church), and reducing the moveable feasts entirely to the rules of the church of Rome.

Though polygamy and divorce are no doubt inconsistent with the pure doctrines of the gospel, yet it was very improper to meddle with these practices at once in such a violent manner. Besides the confusion that this would naturally occasion in private families, these practices gave occasion to many questions in law, which it belonged to the civil judges to decide; but now these were all subjected to the authority of the patriarch.
in occasion, and refused at his pleasure; others being granted in their place, so that neither prelates nor monks have any property in them. On the present occasion, an Abyssinian nobleman had possessed some lands belonging to a Catholic monk; for which he was called before the patriarch. On his refusing to submit to this new tribunal, he was instantly condemned to restore the lands; but refusing this also, the patriarch took an opportunity, as he was attending the emperor at church, to pronounce sentence of excommunication against him, giving him over at once, soul and body, to the devil. On hearing this terrible sentence pronounced, the nobleman fainted away, and was with difficulty recovered. On the intercession of the emperor, however, the corrupt was taken off; but the incident produced a very disagreeable effect on the minds of the people, who found that day began to entertain a greater avarice than ever to the Roman Catholics and their priests. This avarice was greatly increased by the absurd conduct of the patriarch, in ordering the body of an Abyssinian fainted to be thrown up, and thrown out of the grave in an ignominious manner, because it had been buried under the altar of a church, which he imagined was thus defiled. In all other respects, the patriarch behaved in such an inept and overbearing manner, that the effects of his oppression began to be universally felt, and the Catholic religion began very quickly to decline.

The first stroke given to it was the alteration of the liturgy; which was done at the desire of the emperor. Ever since the establishment of the Catholic religion, the Latin mass-book, &c. had been made use of according to the practice of the church of Rome; but as it seemed very unreasonable to impose this at once upon the Ethiopians, Socinios ordered the patriarch to make such alterations in the old Abyssinian liturgies as he thought proper, that the people might thus have an opportunity of paying their devotions in a language they understood. The patriarch, not being able to align any solid reason to the contrary, was obliged to comply; but no sooner was this done than the people made use of their old liturgies entirely, without the least regard to the innovations of the patriarch. In the midst of the confusion which daily took place from these causes, the Galla made a dreadful invasion, and cut off one of the emperor's generals with his whole army; nor were all the abilities of Sela Chri- tos, who had so often distinguished himself, sufficient to retrieve matters; so that the savages, after having ravaged the country for some time at pleasure, returned home loaded with booty. This misfortune was followed by the revolt of Tecela Georgis the king's son-in-law; who not only made religion the pretence for taking up arms, but insulted the Catholics in the most outrageous manner; collecting their images and other religious trinkets into an heap, and then publicly setting fire to them. After this he called before him his own chaplain, named Abbe Jacob, who was a Catholic, stripped him of his pontificals, and killed him with his own hand. A reconciliation with Socinios was now impossible; so that he had no recourse but in arms. In this, however, he was equally unsuccessful with the Ethiopians. Other rebels in this reign, being defeated, taken prisoner, and put to death along with his father Abderas, notwithstanding the intercession of a Catholic missioner, were all defeated, and taken, and put to death for him, and that of the queen and ladies of the court for his father.

As the reasons given by the king for refusing such powerful intercession were purely religious, the people became more and more averse to a profession so extremely oppressive and barbarous as that of Rome seemed to be. A revolt of the Agows quickly followed; not that religion had really any share in their determinations, but that they were exasperated by the slavery and oppression to which they saw themselves subjected. They now therefore set up Melcha Chri- tos, a prince of the royal blood, as a pretender to the crown; and soon put on such a formidable appearance, that the king himself thought proper to march against them with an army of 30,000 fighting men, which with the servants and other attendants amounted to more than 80,000. Melcha Chri- tos retired with his troops to the craggy mountains of the country; and being imprudently followed by the emperor, rolled down such quantities of stones from the precipices, that Socinios was obliged to retreat with great precipitation, after having left almost half his army.

On this defeat the emperor found himself obliged to apply to Sela Chri- tos, whom he had again disgraced by depriving of his government. He succeeded in Sela Chri- tos giving the rebels a dreadful overthrow, which for some time entirely broke their power; but this success was quickly followed by the revolt of Laca Mariam, a Laca Ma- rian, in bearing relation to the king. He also was defeated, and was obliged to retire to a mountain so steep, that though vol- and death, he ascended it in safety, he was dashed in pieces with many of his followers, in attempting to de- fend; the rest, who escaped this danger, being killed by their pursuers. Still, however, the rebel Mel- cha Chri- tos was unfelted; against whom Prince Facilidas, the heir apparent to the throne, was sent, having under him a nobleman of most distinguished character named Keba Chri- tos. The latter was de- feated and killed, without its being in the power of Facilidas to do anything towards the suppression of the rebellion. This misfortune was followed by the death of Pecor Eggez, formerly ambassador with An- tonio Fernandes to the pope, but now lieutenant-gen- eral to Sela Chri- tos. He was cut off with a small body of troops by the Galla; and from many misfortunes befalling the imperial troops, the power of Mel- cha Chri- tos was augmented to such a degree, that he now began to act as a king, and appointed a deputy-governor to one of the provinces. His opinion of his own importance, however, had almost proved his ruin; for the new governor having appointed a great festival on Saturday, in opposition to the royal edict, he was attacked by a party of the king's troops, and entirely routed with the loss of 4000 of his men. This defeat was revived by an overthrow given to Prince Facil- das himself; the blame of which was laid upon Sela Chri- tos. The latter, as we have often had occasion to observe, was not only a most valiant commander, but a rigid Catholic; and these two properties might naturally have been thought to secure him in favour with the emperor. His violent conduct in regard to p. 256

Several of the rebels applied to the king, who had again disgraced himself by depriving of his government. He succeeded in Sela Chri- tos giving the rebels a dreadful overthrow, which for some time entirely broke their power; but this success was quickly followed by the revolt of Laca Mariam, a Laca Ma- rian, in bearing relation to the king. He also was defeated, and was obliged to retire to a mountain so steep, that though vol- and death, he ascended it in safety, he was dashed in pieces with many of his followers, in attempting to de- fend; the rest, who escaped this danger, being killed by their pursuers. Still, however, the rebel Mel- cha Chri- tos was unfelted; against whom Prince Facilidas, the heir apparent to the throne, was sent, having under him a nobleman of most distinguished character named Keba Chri- tos. The latter was de- feated and killed, without its being in the power of Facilidas to do anything towards the suppression of the rebellion. This misfortune was followed by the death of Pecor Eggez, formerly ambassador with An- tonio Fernandes to the pope, but now lieutenant-gen- eral to Sela Chri- tos. He was cut off with a small body of troops by the Galla; and from many misfortunes befalling the imperial troops, the power of Mel- cha Chri- tos was augmented to such a degree, that he now began to act as a king, and appointed a deputy-governor to one of the provinces. His opinion of his own importance, however, had almost proved his ruin; for the new governor having appointed a great festival on Saturday, in opposition to the royal edict, he was attacked by a party of the king's troops, and entirely routed with the loss of 4000 of his men. This defeat was revived by an overthrow given to Prince Facil- das himself; the blame of which was laid upon Sela Chri- tos. The latter, as we have often had occasion to observe, was not only a most valiant commander, but a rigid Catholic; and these two properties might naturally have been thought to secure him in favour with the emperor. His violent conduct in regard to
the Catholic religion, however, had raised him to
many enemies, whose confecrations were perpetually brought
against him; and one disgrace constantly followed another,
notwithstanding all his services. The present
occasion was brought by one Lefan Chriftos, whom
Sela Chriftos had formerly condemned to death. For
this offence he had received a pardon from Socinios;
and he now revenged himself upon his former judge by
accusing him to his sovereign. Sela Chriftos was not
omniscient of this conduct; and therefore, as soon as
he had him in his power, put him to death without
regarding the pardon he had received. The emperor
upon this deprived him of the government of Gojam,
which he gave to Serca Chriftos, who was supposed to
be a dependent on Prince Facilidas, and was besides
cousin to the emperor himself. The new governor,
on his entering upon office, promised solemnly to sup-
port the Catholic religion; but no sooner did he ar-
rive in Gojam, than he solicited Prince Facilidas to re-
bell against his father, and re-establısh the Alexandrian
faith. This was not the only instance in which he
showed his disobeisence. He had received the charge
of a caravan which came annually from Narea; but
instead of acting properly in this respect, he employ-
ed himself in driving off the cattle of the Agows and
Damos, who expected no harm, and were consequently
quite unprepared. Such numbers of them were
carried off on this occasion, that 100,000 are said to
have been sent to the Abyssinian market. Socinios,
when informed of such an atrocious robbery, ordered
him to restore the cattle, and to surrender himself
prisoner; but instead of complying with this order, he
again solicited Facilidas to revolt against his father.
For this he was harshly reproved; but now, deter-
mining to make the world believe that the prince had
entered into his schemes, he sent a public message
to him, in which he was desired to come and take pos-
session of the kingdom. Facilidas imprisoned the
person who brought this treasonable message, and soon af-
fter sent him to Socinios; but Sela Chriftos still per-
mitted in his mad attempts. He now proposed to abol-
ish the Romish religion throughout the kingdom; and
with that view attacked a convent which Sela Chriftos,
had built in Gojam; but the fathers having been fur-
neced with some fire arms, made so good a defence,
that he was obliged to give over the enterprise. He
then took the last step to complete his folly, by open-
ly revolting against the emperor, and setting up a
prince of the blood-royal in opposition to him, whom
he had found living in obscurity among his mother's
relations. To cut off all possibility of reconciliation
with the emperor, he renewed the sacrilegious practices
of Georgis, and put to death a priest for refusing to
deny the two natures of Christ. Thus he procured a
multitude of enthusiasts to join him; but when the
affair came to a decision, and Prince Facilidas with a
well disciplined army was sent against him, it then be-
came evident how little the fanaticism of a tumultu-
ous rabble availed against the skill of a regular army.
The rebels fought, however, with great obstinacy till
most of them were killed, their commander being ob-
ligated to take refuge on a mountain; from whence be-
ing unable to make his escape, he at last came down
and surrendered at discretion. We need not doubt of
his fate: but notwithstanding the execution of this
rebcl, another still remained. This was Melca Chri-
astos, against whom the emperor next prepared to
march. He now found, however, the bad con-
sequences of having acted so violently in favour of the
Catholic religion. His army was so disaffected, that
he could fearlessly put any confidence in them. For
this reason he issued a proclamation, that such as chose
to observe the Wednesday as a fast instead of Satur-
day, had liberty to do so. This and some other indu-
ligencies being reported to the patriarch, the latter
sharply reproved him as committing an encroachment
entirely against the priesthood; and put him in mind of the
punishment of decorum inflicted upon Uziah for al-
miring the priest's office. Thus an altercation com-
mented; and it is evident, from the behaviour of
Socinios, that his extreme favour for the Romish reli-
gion began to decline. After this he set out for the
country of Lafta, where Melca Chriftos was; and the
entrance to which was guarded by very high and rag-
ged mountains. Among these the rebels had strongly
fortified themselves; but were driven from four pois
by the king's troops, so that the latter imagined a
complete victory had been gained. Assembling them-
selves, however, on the top of another high mountain,
the rebels watched their opportunity; and defending
suddenly upon them, cut off great numbers, and obliged
the rest to make a precipitate retreat. Another cam-
paign was therefore necessary; but now the army left
all patience. They were become weary of making war
on their countrymen; and, after slaughering them in
the field, seeing the intervals between the campaigns
filled up with numerous executions of those who had
escaped the sword. A deputation was therefore sent
from the soldiers by Prince Facilidas, who, though he
had never declared his sentiments openly, was strongly
suspected of being no friend to the catholics. The
purport of the deputation was, that they did not mean
to say that the Romish profession was a bad one, but
it was such as they could not understand; and conse-
quently there could be no merit on their part in pro-
testing it. They were ready, however, to lay down their
lives for the public good, provided their ancient
religion was restored; but this was a point they would
not give up, and without which they would neither
concern themselves in the quarrel, nor even with fac-
cesses to the emperor's army. With regard to the Ro-
miss religion, they added this declaration, perhaps the
strongest possible mark of averseion, that they did not
without knowing any thing about it. Socinios, there-
fore, according to the Abyssinian accounts, promised to
restore the Alexandrian faith, on condition, that he
turned victorious from Lafta. The army then re-
dily agreed to follow him wherever he pleased; while
the rebels, having left their strongholds in Lafta, proba-
bly from a confidence in their own strength, boldly
marched towards the royal army. In the engagement,
however, they did not show their usual acclivity, and
were soon defeated with the loss of 800 men. Many
of their chief officers were killed on the spot, and Melca
Chriftos himself escaped only by the swiftness of his
horse.

By this victory the power of the rebels was broken;
but it was not attended with the same satisfaction to
the people with which other victories were wont to be
accompanied. On viewing the field of battle along

with

E T H

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E T H

Ethiopia.

260
Sela Chriftos

260
Deprived

of the

govern-
ment

Revolts
of the newgo

vernor.

265
The empe-

rater
defeat-

ed.

266
The army

requires

the

refor-

tion of

the

Abyssinian

faith.
The emperor, his own kingdom; and immediately afterwards the new veterate enemy to the Catholic faith. As opposed to the Catholics, and deferring this proclamation, wherein he declared (he Alexandrian patriarch would have commenced: for this reason he was determined to grant indulgence to such people of Abyffinia; who had done so could not be permitted to renounce the faith of Rome was not a signal victory. To this Socinios replied in general, that he should consider of the matter, and that he had done every thing in his power to establisb the Catholic religion; for which he had been quite way, and only deferred his journey till the year, and with him fell all the hopes of the Jesuits. For this reason he was conjectured, that though the faith of Rome was not a bad one, yet the emperor, understanding well the purport of his discourse, replied, that if this was the case, he was no longer master of his own kingdom; and immediately afterwards issued a proclamation, wherein he declared the Alexandrian faith restored, with the altars for the sacrament, liturgy, and every other thing belonging to it; at the same time, that being now old and infirm, he himself resigned the crown and empire to Facilidas.

This remarkable proclamation was made on the 14th of June 1632; after which Socinios took no farther care of public affairs, nor did he long survive this tranflation. He died on the 7th of September this year, and with him fell all the hopes of the Jesuits. Facilidas, as he had been rightly conjectured, was an inveterate enemy to the Catholic faith. As soon therefore as he had obtained the government, even before he took upon himself the title of king, the Catholics were everywhere displaced from offices of trust and honour; but as soon as he found himself established on the throne, a letter was sent to the patriarch informing him that as the Alexandrian faith was now restored, it became indispensable necessary for him to leave the kingdom, especially as the new Abuna was on the way, and only deferred his journey till the Romish priests should be out of the country. For this reason he commanded the patriarch, with all his brethren, to leave their convents throughout the empire, and retire to Framon in the kingdom of Tigre, there to wait his further pleasure. The patriarch attempted to soften him by many concessions, but in vain; on the 9th of March 1633 he was ordered, with the rest of the fathers, to proceed immediately for Frémisia. This they were obliged to comply with; but the emperor, understanding that they were about to establish themselves in his kingdom, and to solicit favours from Spain to accomplish their purposes by force, he sent orders to the patriarch to instantly deliver up all the gun-powder they had at that place, and to prepare without delay to get out for Mafialah. Still the intreated and obstinately persisted not to comply with the emperor's orders. At last he thought proper to deliver up the gun-powder; but resolved to leave his companions behind him, and to distribute them as much as possible through the empire, in case he himself should be obliged to embark at Mafialah; which, however, he did not by any means intend. For this purpose he applied to the Emirharangafth, named John May, then in rebellion against the emperor; who carried them all off from Frémisia in the night-time, under a guard of soldiers, and lodged them safely in a strong fortress named Adicota. Here the patriarch imagined that he might remain in safety till he should be able to procure succours from India. In this, however, he was deceived. John conveyed them to place to place through many unwholsome situations, till their strength as well as their patience was exhausted. At last, on receiving a present of gold, he allowed them to return to their old habitation Adicota. Facilidas, then, being determined at all events to get rid of such troublesome guests, endeavoured to prevail upon John by bribes to deliver them into his hands. John was too delicate to comply with this request, which he supposed would be a violation of hospitality; but he consented, on receiving a proper compensation, to send them to the Turks. Two were left in Abyffinia, in hopes of soon sharing the crown of arch and martyrdom; and this indeed Facilidas did not delay to make them inhabitants of the empire, and to put them in possession of both, by sending orders for their execution as soon as he got them into his power. Not content with this, and being perpetually apprehensive of fresh invasions from Europe, he entered into a treaty with the Turkish sultains to keep the ports of Mafialah and Sukem shut against them; by which their entrance into Abyffinia would be effectually prevented.}

During these transactions, the emperor took the most efficacious methods otherwise to eradicate the Romish religion, by cutting off the principal persons who professed it, or obliging them to renounce the profession. The principal of these was his uncle Sela Christos, who had deferted so well of the late emperor Socinios, and of the whole empire in general. His exdeathful bigotry in religious matters proved the cause of his destruction, as has formerly been hinted. When it was proposed to him to renounce his faith, he absolutely refused to do so, either to avoid the greatest punishment the king could inflict, or to obtain the greatest gift he had in his power to bestow. On this he was banished to an unwholsome district among the mountains of Samen; but as even here he kept up a correspondence with the Jesuits, and wished to facilitate the introduction of more Purguque from India, he was sentenced to be hanged on a cedar tree.

The expulsion of the present race of missionaries did not entirely discourage the Europeans from attempting
A new million under taken by six Franciscan Capuchins

Four of them murdered, and the other two return.

Three others murdered by order of Facilidas.

Melchisedec continued as much in opposition to his sovereign as when he first took up arms on pretence of religion. At first he met with extraordinary success; totally defeated the royal army though commanded by Facillidas in person; after which, pursuading his good fortune, he made himself master of the capital, entered the palace, and was formally crowned king. This, however, was the last of his good fortune. Facilidas having recourseted his army as fast as possible, sent three able generals to attack his rival, who was now acting the sovereign in his palace. The rebels were surrounded and killed before they expected any enemy, and almost entirely cut off, Melchisedec himself being killed in the engagement.

The victory over Melchisedec was followed by several successful expeditions against the Agows and Gallia; but in the 6th year of the reign of this emperor, the rebels of Lafta, who seemed determined not to yield while they retained a possibility of resistance, chose the son of Melchisedec for their king, and again began their depredations on the neighbouring provinces. Facilidas marched against them with his usual activity; but had the misfortune to lose the greatest part of his army by cold among the mountains of Lafta, though it was then the time of the equinox, and consequently the fan was only 12° from being vertical, the latitude of Lafta being no more than 12°, and the sun 12 hours in the day above the horizon.

Before this rebellion could be suppressed, another was begun, at the head of which was Claudius the king's brother. He had not the same good fortune with the rebels of Lafta; but was quickly defeated, taken prisoner, and banished to a mountain called Wechut; which served from that time for the imprisonment of the princes of the blood-royal. The suppression of one rebellion, however, seemed to have no other effect than that the blood of giving rise to another. A new expedition was to again be undertaken against the Agows and Shangalla; but in the event they had posted themselves so advantageously, that the royal army was entirely defeated without being able to make any impression on their enemies. Facilidas, however, knowing that this defeat could be attended with no other bad consequence than the loss of the men, and Shangalla, which had already happened, marched directly against galla.

The rebels of Lafta without attempting to revenge the defeat they had sustained. The rebel general, weary of contention, in which he probably saw that he would be finally unsuccessful, chose to submit unconditionally to the emperor; who, though he at first affected to treat him with severity, soon after released him from prison, bestowing upon him large possessions in Begemder with his daughter Theoclea in marriage.

Facilidas died in the month of October 1665, and Reign of was succeeded by his son Hannes. This prince was such an enthusiast for Christianity, that in the very beginning of his reign he issued a proclamation forbidding the Mahometans to eat any flesh but what was killed by Christians; but so far was he from any inclination to favour the Catholics, that he ordered all their books which could be found in the empire, to be collected in a heap and burnt. Much of his time was spent in regulations of church-matters, and in contentions and trifling disputes with the clergy; which conduct so disgusted his son Yafous, that he fled twice from the capital, but was pursued and brought back. The last time was in the year 1680, when he found his father ill of the distemper of which he died. Hannes expired on the 7th of July that year, having lived at peace during the whole of his reign, excepting some trifling expeditions against the Shangalla and rebels of Lafta.

Yafous, who succeeded to the throne with the approbation of the whole kingdom, was of a very different disposition from his father; being generous, active, and brave to a great degree; he was also much less bigoted, and differed from him considerably in religious principles. Having settled church-matters as he thought proper, his next step, and the most glorious action of his whole reign, was to pay a visit to those of the royal family who were confined on the mountain of Wechne. He found them in the most miserable condition; all in tatters, and many altogether naked; their revenue having been ill-paid by his father, who was of a fordid disposition, and the little they received having been embezzled by their keepers. Yafous being greatly moved at this spectacle, ordered a large sum of money to be divided among them for their present necessities, clothed them according to their rank, and settled matters so that no part of their revenue could ever afterwards be applied to improper purposes. To the governor of the mountain he assigned a large tract of territory, to make amends for the profit he had been accustomed to derive from the revenue of the princes; and finally, he left all the princes at the foot of the mountain, at perfect liberty either to take up their residence there or anywhere else. By these extraordinary instances of royal munificence the emperor so effectually gained the affection
In the mean time an unforeseen accident procured an attack formed against their followers, who were overthrown, as usual, in battle, and the survivors had it also in charge to penetrate if possible into Abyssinia; and to keep up, as far as was in their power, the Catholic faith, until a better opportunity should offer of making an attempt to convert the whole empire. For this purpose a convent was procured for them at Asmara in Upper Egypt, and permission was granted, notwithstanding their former banishment, to settle two of their order at Cairo independent of the fathers of Palestine.

While these transactions passed in Italy and Egypt, Louis XIV. of France was in the height of his glory. He had attempted to rival the ancient Greeks and Romans in the magnificence of his works; but his conduct with regard to religion, his persecution of the Protestants, and revocation of the edict of Nantes, had disgraced him throughout the greatest part of Europe as a bloody and merciless tyrant. To wipe off this stain, the Jesuits, his great spiritual directors, formed a scheme of inducing the emperor of Abyssinia to send an embassy to France; after which they hoped that they might get themselves replaced in the Ethiopian mission, to the exclusion of the Franciscans. The king, whose whole pride was very much flattered by the proposal, readily came into it; but the Pope's consent was still necessary. His Holiness was by no means pleased with this intrusion of a temporal prince into spiritual affairs; nevertheless he did not choose to enter into any contest; but that he might undo with one hand what he did with the other, he appointed an able Jesuit, whom Verneau, the ambas-ador of Louis to himself, was one, to be missionaries to Abyssinia, but the superior of the Franciscans to be his legate à tertre at that court; providing him with suitable presents for the emperor and principal nobility.

The Jesuits now finding themselves in danger of being supplanted by the Franciscans, applied to the Pope to know which of the two orders should make the first attempt to enter Abyssinia; but received no other answer than that those who were most expert should do so. Verneau, probably displeased at this conduct of the Pope, went to a convent in Syria of which he was superior, without making any attempt to enter Ethiopia; therefore the mission remained in the hands of two persons of opposite professions, a Jesuit and Franciscan, the name of the latter being Pachial, an Italian; and of the former Broussard, a Frenchman. The latter was accounted a man of learning and probity, zealous in the cause of his religion, but by no means imprudent or rash in his attempts to promote it.

In the mean time an unforeseen accident procured the admittance to the missionaries into Abyssinia more readily than could have been expected in the present situation of affairs. Yafous and his son both were attacked by a scurvy-like disorder which threatened to

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Though Yafous is said to have possessed all the qualities which constitute a great and good monarch, the natural turbulence of his subjects, and the penniless disposition of the monks soon began to show themselves by new seditions. These were preceded by a violent irruption of the Galla, who were overthrown, as usual, with great slaughter; but soon after, being solicited by some monks who had drawn over a party of the Agows to their side, the disturbances were renewed. A grandee of Socinios, who had fled to the Galla when Fadlidas first banished the princes to Wochine, was proclaimed king. A multitude of savages immediately flocked to his standard, so that he was soon at the head of a very formidable army, while the Agows and other malcontents were ready to join him as soon as he should repel the Nile. The king, however, entirely disconcerned the scheme by his activity; for, advancing with the utmost celerity, he reached the banks of the Nile, before the Galla on the other side were ready to join their allies on this side of it. The Agows were so confounded at his presence, that they allowed him to pass the river unmolested. The Galla were equally surprised at seeing the war transferred into their own country; and, with their usual fickleness, deserted the prince whose cause they had previously tendered to espouse. A few remained faithful, but were utterly defeated by the forces of Yafous; the unhappy prince himself, whose name was Ijaaa, being taken prisoner, and put to death in the presence of his rival. After this many great exploits were performed against the rebellious Agows, Galla, and other savages; but which, as they produced no other consequence than that of establishing the emperor's character for valour and skill in military affairs, we shall here pass over; only remarking, that, in the opinion of his subjects, one of his campaigns was the most glorious ever recorded in the annals of Abyssinia. The most memorable events in the present reign regarded religion, and a renewal of the correspondence between Europe and Abyssinia; of which we have a particular account from Mr. Bruce to the following purpose. About the end of the 17th century a number of Franciscans from Italy settled at Cairo in Egypt, and were maintained at the expense of the fathers in Palestine, though pretending to be independent of their superior the guardian of Jerusalem. The latter, displeased at this method of proceeding, offered to supply the mission to Egypt entirely at the expense of Palestine, and likewise to furnish from thence missionaries capable of instructing the people in the Christian religion. This offer meeting with a favourable reception at Rome, a new set of missionaries from Jerusalem, called by our author Capuchins, appeared at Cairo, from whence the Franciscans were banished, only two of them being allowed to remain in that city. The others returned to Rome; where, finding that they could not re-establish themselves by fair means, they had recourse to artifice and fiction. It was now pretended, that, on the expulsion of the Jesuits from Abyssinia, a great number of Catholic Christians had fled into the neighbouring countries of Nubia and Sennar, where they found themselves so grievously oppressed by the Mahometans, that, without some spiritual assistance, they would be under the necessity of renouncing their religion. This story being confirmed by the two Franciscans who remained at Cairo, the cause of these supposed Christians was eagerly espoused by the religious in Italy, and a new million set on foot at the expense of the pope for their relief, which continues to this day under the title of the "Ethiopic mission." The missionaries had it also in charge to penetrate if possible into Abyssinia; and to keep up, as far as was in their power, the Catholic faith, until a better opportunity should offer of making an attempt to convert the whole empire. For this purpose a convent was procured for them at Asmara in Upper Egypt; and permission was granted, notwithstanding their former banishment, to settle two of their order at Cairo independent of the fathers of Palestine.

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In the mean time an unforeseen accident procured the admittance to the missionaries into Abyssinia more readily than could have been expected in the present situation of affairs. Yafous and his son both were attacked by a scurvy-like disorder which threatened to...
turn to a leprosy; on which one Hagi Ali, a Mahometan factor at Cairo, received orders to bring with him an European physician on his return to Abyssinia. It happened that this man had formerly been acquainted with Friar Pachal, who had administered some medicines to him. He now proposed that Pachal should accompany him to Abyssinia in the character of a physician, and that Friar Anthony, another of his own order, should go with him as his companion. But this scheme was frustrated by Maillet the French conful, who had the charge of the whole from Louis XIV. and wished that the Jesuits alone should have the conduct of the million. For this purpose he represented to Hagi Ali, that Friar Pachal understood nothing of medicine; but he promised to furnish him with another, whose skill he exalted above all others of ancient or modern times. Hagi Ali, who knew nothing of the matter, readily agreed to Maillet's proposal; and Charles Poncelet, a Frenchman, who had been bred a chemist and apothecary, was appointed to the office of physician, with Father Brevedent to attend him as a servant. Thus the scheme of the Franciscans was for the present overthrown; but luckily Maillet employed one Ibrahim Hanna, a Syrian, to write letters to the Abyssinian monarch and some of his principal nobility, which he desired him to submit to the inspection of one Francis a capuchin or monk of the Holy Land, and consequently an enemy to the Franciscans. Ibrahim, not being acquainted with the monk he mentioned, and thinking any other would answer as well, carried the letters to one of the same name, but of the Franciscan order. Thus the whole secret was divulged at once; and the Franciscans, with the malevolence essential to such religious miscreants, resolved on the destruction of Poncelet and his attendants. At present, however, their sanguinary intentions were defeated; Poncelet set out immediately after he had received his commission, and arrived safe at Gondar the capital of Abyssinia, with his attendant Father Brevedent, on the 21st of July 1699. Brevedent died on the 4th of August; but Poncelet lived to execute his commission, by making a full cure of his royal patient. On the 2d of May 1700, he set out on his return for Europe, and arrived at Mafhah without any bad accident.

It has already been observed, that the main end of this undertaking was to procure an embassy from Abyssinia to the French monarch; and this end also was gained. An ambassador was procured, but unluckily not such as M. Maillet the chief manager of the whole project desired. This man, intoxicated with absurd notions of nobility and distinctions of rank, could not make allowance for the difference between the appearance of an ambassador from a barbarous monarch, however powerful, and one from the sovereign of a civilized and polite nation. The ambassador sent by Yafous, therefore, having been originally no other than a cook, could not be acceptable to a man of such distinction. The pretensions of the Abyssinian monarch indeed, had they arrived, would have probably conciliated matters. These were, an elephant, four Abyssinian young women, &c. but unluckily the elephant died, and the ambassador was robbed of all the rest by a Turkish bawab. Maillet, therefore, naturally proud, imperious, and covetous, thought proper to call in question the authenticity of Morat the ambassador's mission, to call Poncelet himself a liar, and not to allow the former to proceed to France. The transaction on this occasion are set forth at length by Mr Bruce, greatly to the disgrace of Maillet; but as details of this kind would swell the present article beyond due bounds, we must refer the curious reader to the work just mentioned.

Thus the scheme of procuring an embassy from Abyssinia having proved abortive, the next project of the Jesuits was to get an embassy sent from France, whose object was to be the cementing a perpetual peace between the two nations, and to establish a lasting and commercial intercourse, though whatever friendship or good-will might take place, it was evident that he had not a single friend in the world except Maillet and the Jesuits. Unluckily the conful misled him in one of the most material articles, and which was undoubtedly of the utmost consequence to him in the accomplishment of his purpose, viz. the presents necessary to be taken with him for the barbarous people through whose country he was to pass. Brocades, satins, and trinkets of various kinds, according to Mr Bruce, were the proper wares; but, instead of this, he had taken along with him mirrors of various kinds, with the pictures of the king and queen of France, wearing crowns upon their heads. The former of his countrymen, he had a violent predilection for the Jews, carriage and manners of France, and a hearty contempt for those of all other nations: this he had not addressed enough to disguise; and this endangered his life. Besides these disadvantages, he had the misfortune to be under the displeasure of all those of his own nation who resided at Cairo; so that the merchants were very much averse to his embassy; and, as the Franciscans and Capuchins were his mortal enemies, he lived in a constant necessity of being upon his guard. The former of his countrymen, he had a violent predilection for the Jews, carriage and manners of France; and a hearty contempt for those of all other nations: this he had not addressed enough to disguise; and this endangered his life. Besides these disadvantages, he had the misfortune to be under the displeasure of all those of his own nation who resided at Cairo; so that the merchants were very much averse to his embassy; and, as the Franciscans and Capuchins were his mortal enemies, he lived in a constant necessity of being upon his guard. The former of these subjected him to the imputation of being a magician; while the latter, if shown to a Mahometan, would bring upon him the charge of idolatry. The worst misfortune of all was the malice and treachery of the Franciscans, who had already prejudiced against him the people of the caravan with whom he was to go, the governors of the provinces through which his road lay, and the brutal and barbarous inhabitants of Sennaar, who lie in the way betwixt Egypt and Abyssinia. The consequence of all this was, that he was murdered at the last mentioned place with all his remedy. The Franciscan friars, who had preceded him to Sennaar, left it before his arrival, and returned immediately after. There cannot therefore be the least doubt that they were the authors of his murder; though the bigoted disposition of Louis XIV. prevented all enquiry into the matter so that the particular
After the death of Theophilus, the line of Solomon by the queen of Sheba was superseded a second time, and a stranger of the name of Osraas was crowned by the Abyfiiyan throne. The extreme severity of Theophilus in punishing the murderer of Aldeq, saw the murderers of both Yafous and Tecla Haimanout give aside an occasion to this; for as both princes had been assassinated in consequence of conspiracies formed by the principal people of the nation, the number of conspirators was so great, that the parties concerned had interest sufficient to influence the election of the new monarch in this most capital respect, of his not being a descendant of Solomon. Excepting this single defect, he was in every respect worthy of the kingdom, and was already the highest subject in it. Scarcely was he seated on the throne, however, when a dangerous conspiracy was formed against him by the very persons by whom he had been placed upon it. Osraas baffled their designs, by seizing the principal conspirators before they had time to bring their schemes to a bearing; and several people of the first rank were condemned to lose their heads, or to be put to death. After this the emperor undertook an expedition against the Shewally, according to the barbarous custom of the Abyssinian monarchs, who hunt these poor people merely for the sake of making slaves; slaughtering the men without mercy as well as many of the women, and carrying off only the boys and girls into captivity. In this he met with perfect success; and was about to attempt the conquest of the whole country, when he was called back by the news that his prime minister Tafa Chirritos was dead. While the emperor remained in his capital at Gondar, he was taken suddenly ill; which at first imputed to witchcraft, and therefore used some antidotes, among which the smoking of the palace with gunpowder was one. But this was done to carelessly by the servants, that the whole building was consumed, an accident looked upon by the people in general as a very bad omen, especially as the king’s complaint increased every day. At last the principal officers came to pay him a visit of condolence, as they pretended; but in reality to observe the nature of his distemper, and to consult whether or not it was likely to continue till they could fall upon means to deprive him of the government. Osraas understood their intentions, and therefore fummoned all his strength to put on for a moment the appearance of health; so that the officers found him attending business as usual. Being thus disconcerted, it became necessary to make some apology for a visit to extraordinary and formal; for which they were at first somewhat at a loss; on recollection, however, they told him, that, hearing he had been sick, which they happily found was not the case, they had come to make a proposal concerning the succession; professing a desire that he would quiet the minds of his own family, and of the people in general, by appointing his son Iafa successor to the throne after his decease. Osraas gave them an equivocal answer; but the discourse concerning Iafa happened to be over-heard by the soldiers, a violent mutiny ensued, and all the officers who had come to visit Osraas were killed.

Part of the town was set on fire in the confusion; and at last a proclamation was made, that David son of Yafous was king of Abyssinia. The prince was then sent for from the mountain, and arriving at Gondar was crowned on the 30th of January 1714. The emperor...
The emperor at present, not thinking it prudent to proceed any further in the campaign, repaired and ornamented his palaces, in which he employed some Greek artists. For this he remonstrated with continual sedition and rebellion. In one of these the city of Gondar was made a field of battle, and was so frequently set on fire, as to be almost entirely reduced to ruins. Having at last succeeded in reducing all his enemies to obedience, he applied himself to the arts of peace, repairing and ornamenting his palaces, in which he employed some Greek artists. For this he remonstrated at the king's displeasure. Not satisfied with this, they continued their tumult, disregard the imminent danger they were in of falling under the king's displeasure. One of their number was so infuriated as to cry out, that he saw a cherub with a flaming sword guarding the door of the house where they were. Unfortunately, however, they continued their assembly so long, and behaved in such a sedition manner, that the emperor was against them a body of pagan Galla; who falling upon them sword hand, killed upwards of one of the ringleaders, and then rallying out into the street destroyed indiscriminately every one they met. The massacre continued till the next day at noon, when a mob was put to it by the king's proclamation, others.

The vaft quantity of blood so wantonly shed, however, could not but occasion great discontent throughout the capital, and the bad effects of it soon appeared. The king was universally hated, and numerous confpiracies were talked of; but before any pretender to the crown appeared, David himself fell sick, the cause of which was found to be poison. The perpetrators of this crime being known, were instantly put to death; but nothing could save the life of the emperor, who died the 9th of March 1719 in great agony.

David was succeeded by his brother Baculla; who reign of in the beginning of his reign proved very severe and cruel, cutting off almost all the nobility who could be supposed to have had any share in the conspiracies and seditions of former reigns. In the latter part of it he became much more mild, and was beloved by his subjects. He was succeeded in 1729 by his son Yafo. Of Yafo II., who continued long under the regency of his four laln.

Here we must take notice, that though the faith of Abunia is always said to be the same with that of Alexandria, it is not for that reason to be imagined that the clergy are all of the same mind. On the contrary, many different parties exist among them, who hate one another no less than all of them do the church of Rome. The principal of these in the time we speak of were the monks of Debra Libanos and St. Paul of Ethiopia, to which last the emperor himself belonged. On the arrival of a new abuna, it is customary to interrogate him before the emperor and assembly of the clergy, which of the two opinions he adheres to. The emperor at present, not thinking his presence necessary, sent the beuadet with the principal persons of both parties to bear the profession of the new abuna, which was afterwards to be proclaimed to the people. The latter, probably not willing to contend with either party, gave an equivocal answer. But with this the king himself was dissatisfied; and therefore, without consulting the abuna farther, he caused it to be proclaimed, that the new abuna's profession was the same with that of the monks of St. Paul of Ethiopia. This was highly resented by the monks of Debra Libanos, who instantly ran to the abuna, and from him received a profession directly contrary to what had been proclaimed by the king's order. Not satisfied with this, they continued their tumult, disregard the imminent danger they were in of falling under the king's displeasure. One of their number was so infuriated as to cry out, that he saw a cherub with a flaming sword guarding the door of the house where they were. Unluckily, however, they continued their assembly so long, and behaved in such a sedition manner, that the emperor was against them a
of peace, and their forcing him into a war when he had no inclination for it. In a short time, however, the people were perfectly comforted for the loss of their brethren. In the late unfortunate action they were compelled to give up, which it is alleged in Abyssinia to carry into the field of battle in order to ensure victory. Among these was a true picture of the crown of thorns which was put upon our Saviour's head; some pieces of the cross upon which he suffered; a crucifix which had spoken on many occasions; with many other sacred relics of equal value. Soon after the battle all these were redeemed by the priests at an extravagant rate; no less than 8000 ounces of gold having been given for the speaking crucifix; and for the rest, we are to suppose a proportional price had been paid. On the arrival of this trumpery at Gondar, the greatest rejoicings were made, and Yafous was astonished at the people having so soon forgot the lots of their countrymen and relations.

Soon after these transactions the abuna died; but though it was customary for the Abyssinian monarchs to advance the money necessary to bring a new one from Alexandria, Yafous found himself obliged to lay a tax upon the churches for defraying it at this time, having spent all his ready money in repairing and ornamenting his palaces. Three priests, configned to the care of as many Mahometan factors, were sent to Egypt for the new patriarch; but they were detained for some time by the naybe or prince of Mafuah, who extorted from them one half of the money given by the emperor for bringing the abuna from Cairo. Yafous no sooner heard that they were detained at Mafuah; than he sent orders to Suhul Michael governor of Tigre to refuse provisions to the inhabitants of Mafuah, which would soon reduce the naybe to obedience: but as Michael intended soon to quarter with the king himself, he was not in any haste to obey the orders he received. The travellers were therefore detained so long, that on their arrival at Jidaa, they found they had lost the monsoon; and, what was worse, the censer of Mecca would not stand; and the censer of Mecca was the one of such exquisite workmanship that Yafous valued it as he did his own life. Their money was now exhausted; but the rapacious scherif put one of their number in prison, where he continued for a twelvemonth till the money arrived; and from this time these extortions were changed into a fated tribute; 75 ounces of gold (about £186 sterling) being granted for leave of passage to Cairo for the abuna; 90 ounces to the censer, and as many to the naybe, for allowing the abuna to pass from Cairo; an agreement which subsists to this day. Several other intimates of this kind being received from the naybe, Yafous at last discovered that there was a friece alliance between him, the governor of Tigre, and the Baharagast; any one of whom, had he thought proper, could have crushed this pitiful prince with the smallest effort. On this the emperor determined to march against him in person; but was prevented by a rebellion which had been purposely excited in the country of Azab and that of the Dobus. The rebels were easily overthrown; but thus the expedition against the naybe was delayed for a year; during which interval the emperor sent for Michael to Gondar. This order was positively refused, and a war ensued. Michael, unable to contend with the emperor in the open field, took to a high mountain, the usual refuge of Abyssinian rebels. Here also his bad fortune pursued him; all his polls were taken by storm excepting one, which he defended, would like wise have been carried, though not without a very great expence of men. Here Michael requested a capitulation; and to ensure favourable terms, he desired to put into the hands of Tigré a great quantity of treasure, which would otherwise be dispossessed among the common soldiers. This being done, Michael defended with a stone upon his head, as confessing himself guilty of a capital "crime," with a design to make submission to the emperor. This was prevented for one day by a violent form of wind and rain; from which moment the Abyssinians believe he began to convulse with the devil; but Mr Bruce informs us, that he has often heard him say it was Michael the archangel who was his correspondent.

Yafous was firmly determined to put this rebel to death, notwithstanding the quantity of gold he had received; nevertheless a promise was extorted from him that he would grant him his life. As soon as Michael came into his presence, the emperor was filled with indignation, retracted his promise, and ordered him to be carried out and put to death before his tent-door.

The execution of the sentence, however, was prevented by the intercession of all the officers of any confidence in the court or army. Such universal solicitation could not be withheld; Michael was pardoned; but with these remarkable words, that the emperor washed his hands of all the innocent blood which Michael should shed before he brought about the destruction of his country, which he knew he had been long meditating.

Michael continued for some time in prison; but was afterwards set at liberty, and even restored to his government of Tigré. No sooner was he reinstated in this dignity, than collecting an army, he attacked Kammati Woldo governor of Amhara, defeated him in two battles, and forced him to take refuge among the Galla, whom he soon after bribed to murder him. In other respects he behaved as a most dutiful subject, gave the king the best intelligence, and supplied him with soldiers better accounted than he had ever before beheld. He was also more humble than before his misfortune; nor did an increase of his favour and influence make him deviate from the line he had prescribed. Having begun to gain friends by bribery, he continued to add one bribe to another to secure the old, and to gain new ones by the same means, pretending all the while to no kind of dignity or honour, not even to such as was justly due to his own rank. Thus he became such a favourite with the emperor, that he bestowed on him the government of Enderta and Sire, in addition to that of Tigré; so that he was now master of almost one half of Abyssinia. During the reign of Yafous, however, he attempted nothing. The foundations of the disturbances which succeeded were laid by the queen-mother, towards the end of the reign of Yafous. This emperor great civil war in Abyssinia. He had married when very young to a lady of Amha-
both on account of the horrid barbarity of their manners, and the continual wars which from time immemorial had taken place between the two nations. The new king was the daughter of one Amizo, a prince who had once hospitably entertained Baculla before he became emperor; and his people were esteemed theleast barbarous of the whole. A prejudice against her, however, against her offspring, and the emperor himself, never to be effaced, now took place among the Abyssinians; but this did not show itself during the reign of Yafous. The emperor died on the 21st of June 1753, being the 24th year of his reign, not without suspicion of being poisoned by his mother's relations, who were now attempting to engross the whole power of the empire into their hands.

On the death of Yafous, his son Ios by the Galla princes just mentioned succeeded to the throne without any opposition. The discontent which had taken place in the former reign about the power assumed by the relations of the old queen, now began to show itself more openly; and it was complained that a relationship to her was the only way to preferment, by which means the only families, whose merit had often saved the state, were totally excluded from every share of favour. On the accession of the young king, a party of Galla horse, said to be about 1200 in number, were sent as the portion of his mother; and they were quickly followed by a number of private persons from motives of curiosity, or hopes of preferment, who were embarked to the number of 600 into a troop of infantry, the command of which was given to Wooleeka. The great favour in which these people were at court soon induced many others to make their appearance. Two of the king's uncles were sent for by his express desire; they brought along with them a troop of 1000 horse. By the time they arrived the queen was dead; but her two brothers, named Bruhho and Lubo, finding that the king put an entire confidence in them, determined to make a party at court. This was easily effected; every thing was governed by Gaallers; every thing was done to speak their language; while the Abyssinians were to the last degree mortified at seeing their inveterate enemies thus establishment a dominion over them in the heart of their own country. At last the king thought proper to appoint his uncle Lubo to the government of Amhara; but this produced such extensive discontent, that he was fain to retract his nomination, lest a civil war should have ensued. While the empire was thus divided into two parties, Subul Michael came to Gondar in a very splendid manner, on an application from the exiled prince of Sennar to be restored to his kingdom. When conducted into the presence of the emperor, he prostrated himself before him, owned himself his vassal and was put in possession of the government of Ras-el Feel upon the frontiers, with a large revenue, where he was advised to stay till the disputes which subsisted at that time should subside. This fatal advice, however, he had not prudence to comply with; but suffering himself to be decoyed by his asylum into Asbara, was taken prisoner and murdered.

In the mean time, the Abyssinian prime minister, Welde de Oul, died. He had hitherto moderated the fury of the opposite parties by his wife and prudent conduct: but no sooner was he taken out of the way than a most dreadful scene of confusion and civil war took place, which raged with the utmost violence while Mr Bruce was in Abyssinia, and seemed not likely to come to any determination when he left it. The whole empire was divided into two great factions; at the head of one was the old queen-mother of Yafous; and at the head of the other, Ios himself the emperor, with his Galla relations. Matters were first brought to a crisis by the imprudence of the emperor himself in following the government of Begemder upon Brulhe one of his Galla uncles. The government of this province had been lately resigned into the hands of the queen by an old officer named Ayo; and it was supposed that his son named Marium Barea, universally allowed to be one of the most accomplished noblemen of the kingdom, was to succeed him in this government. This opinion was farther confirmed by the marriage of Marium himself with Ozoro Ethier, a daughter of the old queen by her second husband. Unfortunately a quarrel had happened between Kafmai Ayo, the old governor of Begemder, and Subul Michael; a little before the resignation of the former, and continued undecided till Marium took the office upon him. The occasion was quite trifling; nevertheless, as Marium had refused to submit on the decision of the judges, whom he criminalized as partial and unjust, inquiring that the kings should either decide the affair in person, or that it should be referred on the decision of the sword, he thus fell under the imputation of being a disobedient and rebellious subject.

In consequence of this, Ios looked upon him ever afterwards with an evil eye; and now deprived him by proclamation, of the government of Begemder, giving it to his own Galla uncle Brulhe, of whom we have already made so much mention. Another promotion threw the whole empire into a ferment. As Begemder was a frontier province, the country of the Gallers, there was not the least doubt, that, immediately on the accession of Brulhe to his new office, it would be over-run by that army of barbarians, which, for their savage manners, extends itself beyond all the other nations in Africa. This was a more dangerous as there was not above a day's journey between the frontiers of Begemder and Gondar, the capital of the whole empire. Marium Barea himself, who had a high sense of honour, was particular in the matter in which he was deprived of his dignity, and condemned his family to be subject to a race of Pagans, whom he had often defeated in battle, and obliged to acknowledge him as their superior. All remonstrance, however, was vain. Brulhe, under the sanction of the imperial command, advanced with an army to take possession of his new dignity; but fo exceedingly averse were the Abyssinians to follow him in this expedition, that the army disband itself several times after it had been collected; and it took up almost a year before he could proceed from the place where his camp was, at the lake Tzana or Dembes, to the frontiers of Begemder, though scarce half a day's journey distant. Marium Barea beheld his operations with great contempt, employing his time in the dispatch of ordinary business, and endeavouring to reconcile himself to the king, but without success. As his last effort, he sent a remonstrance to the state of the different parts.
...the emperor; in which after many protestations of duty and obedience, he reminded him, that, at his entrance into the office of governor of Begemder, he had sworn not to allow any of the Galla to enter his province; that, should he deviate from the observance of that oath, the safety of the princes in Wechne would be endangered; they would constantly be liable to the invasions of the Pagans, and probably be extirpated, as had already happened at two different times: and he begged of the emperor, if he was determined to deprive him of his government, to befow it rather upon some Abyssinian nobleman; in which case he promised to retire, and live in private with his old father. He had, however, formed a resolution, which he thought it his duty to submit to the emperor, that if his majesty should think proper to come, at the head of a Galla army, to invade his province, he would retire to the farthest extremity of it, till he was flopped by the country of the Galla themselves; and, so far from molesting the royal army, he might be affured, that though his own men might be straightened, every kind of provision should be left for his majesty. But if an army of Galla, commanded by one of that nation, should enter the province, he would fight them at the wall of Fernay, on the frontier, before one of them should drink there, or advance the length of a pike into the province.

This remonstrance had no effect upon the emperor. He returned a scoffing answer, announcing the speedy arrival of Bruhfe, whom he thought fane of victory; but, at the same time, to show that he did not pat confidence entirely in his prowess, he created Sahul Michael governor of Samen, which lay next to Tigre in the way to Samen, so that no obstruction might lie in the way of that officer's march to Gondar, in case there should be any occasion for him. Mariam, provoked at the manner in which he was undervalued in the king's message, gave an ironical reply, in which he alluded to the name of Bruhfe, in the Abyssinian language signifying a kind of bottle: this he told him would be broken on the rocks of Begemder, if sent into that country.

On receiving this last message from Mariam, the king instantly ordered the army to be put in motion; but the Abyssinians had unanimously determined not to act offensively against their countrymen. Bruhfe therefore was left to decide the affair with his Galla. Mariam kept exactly to his word in the declaration he had made to the king, not fliting out of his province, nor allowing the least attempt to be made to harass his enemy, till they were drawn up at the well above-mentioned, where he met them with his army. The Galla, unsupported by the Abyssinian troops, were utterly unable to bear the shock of Mariam's army, and therefore soon betook themselves to flight; but a part of them, who were surrounded by the cavalry, fought valiantly till they were all cut to pieces. Mariam had given the most express orders to take Bruhfe alive; or, if that could not be done, to allow him to make his escape. One of his servants, however, observing him in the field, pushed up through the enemy to the place where he was, and running him twice through with a lance, left him dead on the spot.

Mariam Barea was no sooner informed of the death of his rival, than he cried out in great emotion, that Sahul Michael, with the whole army from Tigre, would attack him before autumn. In this he was not deceived. Ioas instantly dispatched an express for Michael, ordering his attendance, and informing him with the dignity of Ras, by which he became possessed of unlimited power both civil and military. Michael created himself for a long time Intent that matters would come to this crisis at last, and had provided for it accordingly. He now set out with an army of 26,000 men, all of them the best soldiers in the empire, and 10,000 of them armed with muskets. As he passed along, his troops defolated the country wherever they came, but he encumbered his army by nothing useless; allowing his men to carry along with them neither women, tents, beards of burden, nor even provisions. The sublimity of his troops was abundantly provided for by the miserable inhabitants of the provinces through which he passed; and, not satisfied with this, he inflicted on a contribution in money from all the districts within a day's march of those places where he was; the least delay was followed by the slaughter of the inhabitants and destruction of their houses. Towns, villages, and buildings of every kind, were set on fire; as he passed along; the people fled from all quarters to the capital for refuge, as from the face of the most invertebrate enemy; and Ioas himself was now sensible of his having been in the wrong to invest him with such unlimited power. On his arrival at the capital, Michael took possession of all the avenues, as if he meant to besiege it; as that an universal conformation ensued. Instead of offering any hostility, however, he waited with the utmost respect on the emperor, proceeding immediately from the royal presence to his own house, where he sat in judgment, as the nature of his office required him to do. No sooner had he taken upon him this new office, however, than he executed justice in such a vigorous and impartial manner as made the boldest offenders tremble. Some parties of his own foldiers, prefuming upon the licence that had hitherto been granted them, entered Gondar and began to plunder as they had done in other places; but, on the very first complaint, their commander caused 12 of them to be apprehended and hanged. Their execution was followed by 50 others in different quarters of the city; after which he gave the charge of the city to three officers who were to preside over these quarters, himself taking care of the fourth. Two civil judges were appointed to sit with each officer in a district; two were left in the king's house, and four of them held a court of judicature in his own. Thus the inhabitants, finding, that instead of bloodshed and massacre, they were to expect nothing but strict equity, and moderation, became reconciled to Michael the day after his arrival, and lamented only that he had not come sooner to relieve them from the anarchy and confusion in which they had been held so long. To so great a degree of perfection indeed did he bring his legislation, that a very short time after he entered the city, a loaf of bread, a bottle of water, and an ounce of gold, were exposed in the market place on the head of a drum night and day for some time, without any one offering to take them away. This was the more remarkable as there was then a scarcity of provisions, and Michael himself would allow but a very scanty supply of water to be carried into the city, thereby.
thereby giving the inhabitants to understand, that if he should set fire to it as he had done to other places, it would not be in their power to quench the flames.

The capital being thus secured in perfect obedience, Michael next prepared to set out on his expedition against Mariam Barea. Sensible, however, that the destruction of this worthy nobleman would be attended with a great degree of odium, he was resolved that none of it, or at least as little as possible, should fall upon himself. For this purpose, he informed that the emperor should march in person fm Gondar, and carry all his folders along with him. Thus he had an opportunity of throwing the whole blame upon Loas, and representing himself as no more than a passive instrument in the affair. He also took every occasion of praising his antagonist for his virtues, and encafling the emperor for attempting to cut off such an excellent officer.

In the mean time Mariam Barea keeping exactly to the terms of the last remonstrance he had sent to Loas, retired before him to the extremity of the province. Loas and Michael advanced furiously, burning and destroying every thing as they went along. An engagement at last took place at a place called Nefas Mafa, on the extreme borders of Begemder, when Mariam could not retreat without going out of the province. As the royal army was more than twice the number of the other, and commanded by an officer of superior skill, victory was not long of being decided in its favour. Mariam, with 12 of his officers, took refuge in the country of the Galla; but were immediately delivered up by that faithless people. He was put to death by Lubo the brother of Brulhe, who is said with his own hands to have cut his throat as a sleep is commonly killed in this country, and afterwards to have disfigured the body in a shocking manner. The head was cut off, and carried to Michael's tent, which would not allow it to be uncovvered in his presence. It was afterwards sent to the family of Brulhe in the country of the Galla, to shew them what attention had been given to revenge his death; and this displeased the Abyssinians even more than anything that had yet happened since the beginning of the con- flict. The 12 officers, who were taken along with him fought protection in the tent of Ras Michael, to which they were suffered to escape by Woomheka their keeper. Lubo, however, intended likewise to have sacrificed them as he had done Mariam, and therefore sent Woomheka to demand them; but no sooner had he unfolded his errand, than Michael in a rage, called to his attendants to cut him in pieces before the tent-door; which would certainly have been done, had he not fled with the utmost precipitation.

The scandalous ascendency which the Galla always manifested over the king, had greatly displeased Michael; who expressed himself so freely on the subject, that a coolness took place between them. Another officer named Waragna Fafil, a Galla by birth, had intimated himself into the king's favour, and greatly distinguished himself at the battle of Nefas Mafa. It was no wonder, therefore, that he soon became a rival to Michael; and this rivalry was greatly augmented by the following circumstance. Near the field of battle at Nefas Mafa was a house of Mariam Barea, where Ozoro Ether his widow now was. Being surrounded by pleasant and verdant meadows, Fasil encamped there for the sake of his cavalry. No other design was at that time apparent; however, his presence greatly alarmed the princess. She had along with her at that time a nobleman named Aylo Aylo, who had been at the battle of Sennaar; but had there been terrified to such a degree, that he resolved to renounce the world ever after and turn monk. In this character he was now with Ozoro Ether; and though he related to be concerned in any military affairs, he was still confided by both parties as a kind of oracle. In the present emergency, therefore, he told the princess that there was only one way by which she could secure herself from the cruelty of the Galla, and becoming a prey to one or other of the murderers of her husband; and that was by immediately espousing Ras Michael. Ozoro was perfectly sensible of the propriety of the advice, and therefore set out next morning in company with Aylo to Michael's tent. Here the threw herself at his feet on the ground; and refusing to rise, Aylo explained her errand, informing the Ras that she intended to bestow herself upon him in marriage, as being the only perfon not guilty of her former husband's death capable of affording her protection in her present situation. Michael saw clearly the advantages attending such a match; and therefore, having caused the army to be drawn up in order of battle, as if for a review, he sent for a priest, and was married to the princess in the sight of all his men. The ceremony was followed by the loud acclamations of the whole army; and Loas was soon informed of the reason. He expressed his displeasure at the match, however, in such unequivocal terms, that a mutual hatred commenced from that moment. This was soon made public by a very trifling accident. One day while the army was marching, Michael being much incommoded by the sun which affected his eyes, threw a white handkerchief over his head to keep off the heat. This was instantly told the king, who took it as an affront offered to himself; for in Abyssinia it is unlawful to cover the head on any occasion whatever in presence of the emperor, or even within sight of the palace where he lodges. Loas was no sooner informed of the supposed affront, than he sent to the Ras to know upon what account he presumed to cover his head in his presence; but though the covering was instantly taken off, it was thought that no atonement could ever be made for such a grievous offence. Soon after this a quarrel happening between Fasil and a person named Gafhe, likewise a man of great consequence, complaint was made to the Ras, who, as civil judge, summoned both parties before him. Fasil absolutely refused to obey any such jurisdiction; and the affair being laid before the other judges, it was given in favour of Michael, and Fasil declared to be in rebellion. This was followed by a proclamation depriving him of his government of Damot, and every other public office he held. Fasil, however, had no mind to submit to this disgrace; and therefore, after holding a long conference with the king, departed with his army, encamping on the high road betwixt Damot and Gonder, where he intercepted the provisions coming from the southward to the capital. This was followed by a fleet fired from one of the windows of the palace into the bow.
The house where he sat in judgment; the distance being so small, that he could easily be seen from the palace while thus employed. The ball, however, misled Michael, but killed a dwarf who was standing before him fanning the flies from his face. As it was evident that this shot must have been fired with the knowledge of the king, it was rightly judged to be the commencement of hostilities. Joas instantly removed to a distance, but sent Woofheka with orders to the Ras. Michael returned to Tigré without seeing his face; declaring at the same time, his own uncle Lobo governor of Begemder and Amhara. Michael could scarcely be prevailed upon to see Woofheka, and told him that he should certainly be put to death the next time he appeared in his presence. Next day Joas sent a message to the Ras by four judges, commanding him to return to Tigré without the least delay, under pain of his highest displeasure. Michael returned a formal answer, concluding, that he expected the king himself to be ready to defend himself against Ras Michael. To this an answer was given, on which Michael issued a proclamation, commanding all the Galla to leave the capital next day under pain of death; in case of disobedience they were declared outlaws, and liable to be killed by the first that met them if they were found 24 hours after the proclamation in the capital, or to the same penalty if they were found in the kingdom after ten days. An engagement took place a short time after, in which Fail was totally defeated, and obliged to retire into Damot. In this engagement some of the king's black horse were taken. There are all daves, and subject to no other command but those of his majesty himself. The appearance of them therefore showed that they must have been sent by the king to fight against the Ras. All of them were therefore brought before the latter, and interrogated by whose orders they had come to the battle. Two refused to give any answer, and had their throats cut in presence of their companions. A third plainly told them that they had been sent by the king; who had likewise ordered an Armenian to go to Tigré to-morrow. To this an answer was given, on which Michael issued a proclamation, commanding all the Galla to leave the capital next day under pain of death; in case of disobedience they were declared outlaws, and liable to be killed by the king himself, as they were found 24 hours after the proclamation in the capital, or to the same penalty if they were found in the kingdom after ten days.

On the death of Joas, Michael, now absolute master of Abyssinia, set up for emperor Hannes, brother to the late king Baccus, an old man who had reigned almost all his lifetime in the mountain of Wechne, and being entirely unacquainted with the affairs of the world was on this account probably supported by Michael to be the more proper for his purposes. Hannes had been maided by the loss of his hand, on purpose to incapacitate him for the throne; but this objection was laughed at by the Ras. He found him, however, possessed of a quality much more inimical to his own purposes; and that was, an absolute aversion at meddling with the affairs of government; so that he could not by any means be induced to take the field against Fail. Michael therefore was obliged to set out by himself; but thinking it improper to leave a king of any kind behind him in the capital, he had the old man poisoned before his departure; putting his son Tecla Haimanout in his place.

The young emperor, according to Mr Bruce's account, was of a fair complexion, left tawny than an Ethiopian, Neapolitan or Portuguese, owing to his having been born in the mountain. He was endowed with many princely accomplishments; and so much attached to Tecla Haimanout, that he called him Father from the time of his accession, waiting upon him when indigested with the affection of a son. There being now no objection therefore, Michael marched against Fail without delay, and entirely defeated him on 3d December 1769. On this occasion Woofheka was taken prisoner, and afterwards fled alive, notwithstanding the interference of some of Michael's officers for him; his skin being afterwards formed into a bottle. This piece of cruelty was attributed to Ozoro Ethier, whom Mr Bruce represents as the most humane and merciful of women; though he is obliged to allow, that on the present occasion, as well as on every other which regarded her former husband, the entirely forgot her character. The night on which this miserable victim and destroyer, appeared in the king's tent, dressed like a bride; and in a little time returned in triumph to Gondar.

Mr Bruce's arrival and a report of Hannes's being ill, and Mr Bruce was supposed to be his physician, though in truth that emperor was already dead. Here he was ill-treated by the naye, with a design to extort money, and afterwards probably to put him to death, as was his custom with other strangers. He escaped the danger, however, by the protection of Achmet, nephew and heir apparent to the naye; and by his own prudent and resolute behaviour, threatening his adversaries with the arrival of a British man of war in case of any injury; showing the Grand Signor's protection; making use of the name of Ras Michael, now so formidable, and to whom he had obtained a recommendation, &c. After many vexations and delays, he was at last allowed to depart; and a guide, by name Sakeone, was sent along with him. This man was brother-in-law to the naye, and a profound Christian; but a traitor in his heart, and who wished to do every thing in his power to hurt our traveller. He was furnished with another guide, however, by his friend Achmet, to inform him where to pitch his tent and other necessary particulars.

On the 15th of November 1769 Mr Bruce left Arkeeko on the eastern coast of Africa, and proceeded southward for Gondar the capital of Abyssinia. After an hour's journey, he pitched his tent near a pit full of rain-water, where he remained all day; and in the evening a messenger arrived from the naye, who took away the guide Sakeone. Next day the latter returned in company with the naye's nephew, already mentioned. The latter cauffed him to deposit in his hands Sakeone's full hire, as though he had gone the whole length he had promised. Four of the men were commanded to go back to Arkeeko, and others put in their place: after which Achmet told Mr Bruce, that he was not to take the road through Dobawa, though near, because it belonged to the naye; but that Sakeone knew another by a place called Dikan, which belonged to himself, and where he could ensure him of a good reception. In this journey he told him, that he would be obliged to cross the mountain Tarante, the highest in Abyssinia;
The fatigue of this would be more than re-
compensed by the assurance of safety and the curiosity of the place. Taking leave of Achmer in a very friendly manner, therefore, Mr. Bruce with his company finally set out on their journey the evening of the 16th. For the short space they had travelled, the ground was covered with graves broader in the leaf than ours; but in a little time the soil became hard, dry, gravelly, and full of acacia or Egyptian thorn. Next day (17th) they changed their course from south to west; and soon arrived at a range of mountains standing so close to one another, that there was no passage between excepting what was worn by torrents of water; the bed of one of which concomitantly now became their road. In the evening they pitched their tent at some distance from this torrent, which had scarcely any water in it when they left it; but all the afternoon there had been an appearance of rain, with much thunder and lightning, at a distance. On a sudden they heard a noise among the mountains louder than thunder; and instantly saw the torrent, swelled immeasurably by the distant rains, now running like a rapid river, and the foremost part of it advancing in its bed in a body of water about the height of a man.

Having run for some time in this violent manner, the current, no longer supplied by the rains, began to diminish, and by the next morning was quite gone. Among these mountains the nights are cold even in summer.

On the 18th the journey was resumed in the bed of the torrent, which now scarcely had any water; though the fames were rendered very slippery by the quantity of rain which had fallen. Leaving this disagreeable road, they came to a fine rivulet, which being the first clear water they had from the time Mr. Bruce left Syria, was exceedingly agreeable. They proceeded along the banks of this river for some time, and soon after leaving it, they came to another of the same kind; but next day were obliged to resume their course in the bed of a torrent. The mountains in this part of the world are excessively rugged and full of precipices, entirely deftitute of soil, and covered with loose stones of a black colour. On the side of the torrent in which they marched, however, there grew very large sycamore trees, some of them little less than 72 feet in diameter. Their branches afforded shelter to an infinite number of birds; many of them without song; but others having notes very different from the European kinds, and peculiar to the continent of Africa. Most of those which had very beautiful colours were of the jay or magpie kind. The trees were loaded with figs; but they come to nothing, by reason of the ignorance of the savages, who know not the process of capricitation. The streams of water themselves, which at this season were found so delightful, ran only after October; they appear on the east side of the mountains when the summer rains in Abyssinia are ceasing; at other times, no water is to be met with, except what is contained in flagrant pools.

On the 20th of November they began to ascend the high mountain of Taranta. Their road was now excessively rugged and uneven, intersected with monstrous gullies and holes made by the torrents, as well as by huge fragments of rocks tumbled down by the torrents. It was with the utmost difficulty that they could carry the astronomical instruments up this hill; in which work Mr. Bruce himself, and one of his attendants named Taffin, a Moor, bore the principal share. The only misfortune they met with was, that their sails being unloaded, and committed to the care of a single person refused to ascend this barren mountain; and in spite of all that their driver could do, set off at a brisk trot for the fertile plains below. Luckily, however, they were afterwards recovered by four Moors sent after them, and the journey resumed without any material interruption. The beasts were now become much more tractable, having been seen and pur chased by the byzamas with which that mountain abounds.

Taranta is so defitute of earth, that there was no possibility of pitching a tent upon it; so that our travellers were obliged to take up their lodging in one of the caves with which it abounds. The under part of the mountain produces in great plenty the tree called Kolquall, which was here observed in greater perfection than in any other place throughout the whole journey. The middle part produced olives which carried no fruit; and the upper part was covered with the oxycedras or Virginia cedar called azez in the language of the country. On the top is a small village named Hotai, inhabited by poor shepherds, who, in the Holi, keep the flocks of the rich people of the town of Dixon and inhabit below. They are of a dark complexion inclining to tants of the yellow; their hair black, and curled artificially by means of a stick, and which our author supposes to be the same with the ISIS pin mentioned Isa. iii. 22. The men have a girdle of coarse cotton-cloth, woven six times round their middle; and they carry along with them two lances, and a shield made of bulls hides. Besides these weapons, they have in their girdles a crooked knife with a blade about 16 inches in length, and three in breadth at the broader part. There is here Beautiful great plenty of castle of all kinds; the cows generally of a milk white, with dew-laps hanging down to their knees; their horns wide like those of the Lincolnshire castle; and their hair like felt. The sheep are all black both here and throughout the province of Tigre; having hair upon them instead of wool, like the rest of the sheep within the tropics; but remarkable for its lustrous and softness, without any bristly quality. On the top of the mountain is a plain, which at the time our author was there, they had down with wheat. The air seemed excessively cold, though the barometer was not below 50° in the evening. On the west side the Cedars, which on other parts are very beautiful, degenerate into small shrubs and bushes.

The road down this mountain was for some time nothing inferior in ruggedness to what they had met with in ascending it; but as they approached Dixon, it became considerably better. This is the first town on the Abyssinian side of Taranta. It is seated on the top of an hill of a form exactly conical surrounded by a deep valley like a ditch; and no access to it by a path which winds round the hill. The inhabitants were formerly exterminated by Michael Ras; and the succeeding race, in Mr. Bruce's time were of a very indifferent character, being, as he says, composed of the worst people from the territories of the Baharnagha and the province of Tigre, on both of which

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which it borders. Here he was in danger from the treachery of Salome, who wished to have decoyed him into the power of some aulfains. Finding that this could not be done, he surrounded Mr Bruce and his retinue with a body of armed men; but they were dispers'd by the authority of Haig Abdeleazer, the friend of Achmer, who had received orders to provide for the safety of the travellers. The only trade carried on here is that of buying and selling slaves; who are stolen from Abyssinia, chiefly by the priests, and sent into Arabia and India.

The next stage was from Dixer to Adowa, capital of the province of Tigré. Leaving Dixer on the 25th of November, they pitched their tent the first night under a large spreading tree called Daros, which Mr Bruce says was one of the finest he saw in Abyssinia, being about 12 feet in diameter. They had been joined by some Moors driving 20 loaded ass's and two bulls, which in that country are likewise used as beasts of burden. Here, our author says, he recovered a tranquility of mind which he had not enjoyed since he arrived at Mafuah; but these were now entirely without the dominions of the nyaber, and entered into those of the emperor. Salome attended them for some way, and seemed disposed to proceed; but one of the company, who belonged to the Abyssinian monarch, having made a mark in the ground with his knife, told him, that if he proceeded one step beyond that, he would bind him hand and foot, and leave him to be devoured by wild beasts.

Being now in a great measure delivered from their fears and embarrassments, the company proceeded on their journey with pleasure, through a much better country than they had hitherto passed. In some places it was covered with wild oats, wood, high bent-grass, &c. but, in not a few places, rocky and uneven. Great flocks of a bird as large a turkey, called, in the Amharic language, Erkons, were seen in some places. A large animal of the goat kind, called Agazan, was found dead and newly killed by a lion. It was about the size of a large ass, and afforded a plentiful repast. Numbers of kolquall trees were also seen; and the sides of the river Haleb were adorned with a beautiful tree of the same name with the stream. There were in this place also many flowers of various kinds, particularly jellamaine. The mountains of Adowa, which they came in sight of on the 5th of December, were, in general, unlike anything to be met with in Europe; their sides being all perpendicular rocks like siepeles or obelisks of many different forms.

Adowa, though the capital of an extensive province or kingdom, does not contain above 300 houses; but occupies nevertheless a large space by reason of the inclosures of a tree called Wanez, which surrounds each of the houses. It stands on the declivity of a hill, situated on the west side of a small plain surrounded by mountains. It is watered by three rivulets which never become dry even in the greatest heats. A manufacture is carried on here of a kind of coarse cotton cloth, which passes for money throughout all Abyssinia. The houses are built of rough stone, and one being only aded in the construction of those at Gondar, and even there it is very bad.

Our traveller was very hospitably entertained at Adowa by one Janni, with whom he resided during his stay there. Leaving it on the 17th of December, he visited the ruins of Axum, once the capital of the empire. There are 40 obelisks, but without any hieroglyphics. A large one still remains, but the two larger are fallen. There is also a curious obelisk, of which he gives a figure, with other antiquities which our limits will not allow us to enlarge upon. The town has at present about 600 houses, and carries on manufactures of the coarse cotton-cloth already mentioned. It is watered by a small stream which flows all the year, and is received into a fine basin 150 feet square, where it is collected for the use of the neighbouring gardens. Its latitude was found by Mr Bruce to be 14° 6' 56'' north.

On the 20th of January 1770, our traveller set out from Axum. The road was at first smooth and pleasant, but afterwards very difficult; being composed of stones raised one above another, the remains of a magnificent causeway, as he conjectures. As they paffed farther on, however, the air was everywhere perfumed by a vast number of flowers of different kinds, particularly jellamaine. One species of this, named Aguza, was found in such plenty, that almost all the adjacent hills were covered by it; the whole country had the most beautiful appearance; the weather was exquisitely fine, and the temperature of the air agreeable. In this fine country, however, Mr Bruce had the first opportunity of beholding the horrible barbarity of the Abyssinians in cutting off pieces of flesh from the bodies of living animals, and devouring them raw; but notwithstanding this extreme cruelty, they have the utmost horror and religious aversion at the sight of every kind; infomuch that Mr Bruce durst not venture to taste the flesh of a wild boar, left after having affixed in the destruction of five or six.

During the remaining part of the journey from Adowa to Siré, the country continued equally beautiful, and the variety of flowers and trees greatly augmented; but as a report was propagated that Ras Michael had been defeated by Fasil, they now met with some insults. These, however, were but trifling; and on the 2d in the evening they arrived safely at Siré, situated in N. Lat. 14° 4' 35''.

This town is still larger than Axum; but the houses de are built of no better materials than clay, and covered with thatch; the roofs being in the form of cones, which indeed is the shape of all those in Abyssinia. It stands on the brink of a very steep and narrow valley, through which the road is almost impassable. It is famous for a manufacture of cotton-cloth, which, as we have already observed, passes for money throughout the whole empire. At some times, however, beads, needles, admonition, and incense, will pass in the same way. The country in the neighbourhood is extremely fine; but the inhabitants subject, by reason of the low situation, to putrid fevers. On leaving it on the 24th, our travellers paffed through a vast plain, where they could discern no hills as far as the eye could reach, excepting some few detached ones standing on the plain, covered with high grass, which the inhabitants were then burning. The country to the northward is flat and open. In the way to Gondar, however, lie that ridge of mountains called Samen; of which one named Lamenamon is the most remarkable, and by some supposed to be the highest in Abyssinia. Derwits Siré and these mountains

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mountains the river Tacazze runs, which next to the Nile, is the largest in Abyssinia. Mr Bruce informs us that it carries near one third of the water which falls on the whole empire; and when passing it, he saw the marks of its stream, the preceding year, 18 feet perpendicular above the bottom; nor could it be ascertained whether this was the highest point to which it had reached. It has its source in the district of Angot, rising from three sources like the Nile, in a flat country, about 200 miles to the S. E. of Gondar. It is extremely pleasant; being shaded with fine lofty trees, the water extremely clear, and the banks adorned with the most fragrant flowers. At the ford where they crossed, this river was fully 200 yards broad, and about three feet deep; running very swiftly over a bottom of pebbles. At the very edge of the water the banks were covered with tamarisks, behind which grew tall and slaty trees, that never lose their leaves. It abounds with fish, and is inhabited by crocodiles and hippopotami; the former of which frequently carry people who attempt to cross the river upon blown up skins. The neighbouring woods are full of lions and hyenas.

The Tacazze is marked by Mr Bruce in his map as a branch of the Alabores, which falls into the Nile. The latitude of the ford was found to be 9° 32' 45" S. This river was passed on the 26th of January; after which our travellers entered into the country of Sämen; the governor of which, Aytô Tesfô, had never acknowledged the authority of Ras Michael, nor any of the emperors set up by him since the death of Ioas. The country therefore was hostile; but the uncertainty of the event of the war, and the well-known severity of Michael's disposition, preferred our traveller and his company from any insult, excepting a feeble and unsuccess-ful attempt to extort money. Here Mr Bruce observes that the people were more flat-nosed than any he had hitherto seen in Abyssinia. The path among the mountains was for the most part exceedingly dangerous, having a precipice of vast height close by it which way forever you turn. The mountains appeared of very extraordinary shapes; some being like cones; others high and pointed like columns, pyramids, or obelisks. In one place a village was observed in such a dangerous situation, that the distance of a yard intervened between the houses and a dreadful precipice. Below it is a plain of about a mile square, covered with citron and lemon trees. A river named Mat-Luma rives above this village, and falls into the wood, where it divides in two; one branch surrounding the north and the other the south part of the plains; then falling down a rock on each side, they unite; and having run about a quarter of a mile farther, the stream is precipitated in a cataract 150 feet high. The lions and hyenas were very numerous among these mountains, and devoured one of the best males our travellers had. The hyenas were so bold, that they talked about as familiarly as dogs, and were not intimidated by the discharge of fire-arms. Their voracity was such, that they eat the bodies of those of their own species which our travellers had killed in their own defence.

On the 7th of February they began to ascend Lamalon by a winding path fearfully two feet broad, on the brink of a dreadful precipice, and frequently interrupted by the beds of torrents, which produced vast irregular chasms in it. After an ascent of two hours, attended with incredible toil, up this narrow path, they came to a small plain named Kedus or St Michael, from a church of that name situated there. This plain is situated at the foot of a steep cliff, terminating the western side of the mountain, which is as perpendicular as a wall, with a few trees on the top. Two streams of water fall down this cliff into a wood at the bottom; and as they continue all the year round, the plain is thus preferred in continual verdure. The air is extremely wholesome and pleasant. On ascending to the very top of the mountain, where they arrived on the 9th of February, our travellers were surprised to find, that though from below it had the appearance of being sharp-pointed, it was in reality a large plain, full of springs, which are the sources of most rivers in this part of Abyssinia. These springs boil out of the earth, sending forth such quantities of water as are sufficient to turn a mill. A perpetual verdure prevails; and it is entirely owing to indolence in the husbandman if he has not three harvests annually. The Lamalon stands on the north west part of the mountains of Sämen; but though higher than the mountains of Tigré, our author is of opinion that it is considerably inferior to those which are situated on the south-east. The plain on the top is altogether impregnable to an army, both by reason of its situation and the plenty of provision it affords for the maintenance of its inhabitants; even the streams on the top are full of fish. Here the mercury in the barometer stood at 205 inches.

During the time our travellers, remained at La- malon, a servant of Ras Michael arrived to conduct them safely to the capital, bringing a certain account of the victory over Falli; so that now the difficulties and dangers of their journey were over. The country appeared better cultivated as they approached the capital; and they saw several plantations of sugar-canes, which grew from the soil. In some places, however, particularly in Woggera, great damage is done by swarms of ants, rats, and mice, which destroy the fruits of the earth. Mr Bruce had already experienced the mischief arising from a small species of ants, whose bite was not only more painful than the stings of a scorpion, but issued out of the ground in such numbers as to cut in pieces the carpets and every thing made of soft materials to which they could have access.

When Mr Bruce approached the capital, he was dres-fed like a Moor; and this dress he was advised to keep until he should receive some protection from government; his greatness, indeed, his only, danger arising from the priests, who were alarmed at hearing of the approach of a Frank to the capital. This was the more necessary, as the emperor and Michael Ras were both out of town. For this reason also he took up his residence in the Moorish town at Gondar; which is very large, containing not fewer than 3000 houses. The only inconvenience he underwent here was the not being allowed to eat any flesh; for we have already taken notice of a law made by one of the emperors, that none of his subjects should eat flesh but such as had been killed by Christians; and a deviation from this would have been accounted equal to renunciation of Christianity itself. Here he remained till the 15th of February; when Aytô Aylo waited upon him, and addressed him in the character of physician, which he had assumed. By this nobleman he was carried to the palace.
Ethiopia

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Mr Bruce introduced to the queen.

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Is promoted and held in great estimation.

386
His departure from the country.

Event of the war before he left the country.

The history of the war after Mr Bruce's arrival is related at great length in his work. The king Tecla Haimanout still keeping his ground, and was at last acknowledged by almost the whole empire, though success did not always attend his arms. An usurper, named Sosimo, was reduced and made a servant in the king's kitchen; but was afterwards hanged for theft. Ras Michael, notwithstanding all his skill in military affairs, was not able to get the better of Falil; and his excessive cruelty, avarice, and ambition, disgusted every one. An attempt was even made to assassinate him; and his spiritual friend (Michael the archangel, according to his own report, or the devil, according to that of the Abyssinians) at last forsook him; so that he was carried off prisoner by a party of the rebels. After this misfortune he was much deceived; imputing it to the want of the spiritual assistance just mentioned, and which it seems had withdrawn itself some time before. His wife Ozoro Ethifer, whom Mr Bruce characterizes as the handsomest woman he ever saw, was in great favour with the king at the time our traveller left Abyssinia. As the king himself was a handsome young man, there is no improbability in supposing with Mr Bruce, that "they were not insensible to each other's merits;" and as she was sometimes honoured with a private audience, where Michael himself "bore no part in the conversation," we shall conclude our history of this singular empire by a conjecture, that soon after Mr Bruce's departure, Michael either died by course of nature, he being then very old, or was cut off by his enemies; on which Tecla Haimanout, having fully settled the affairs of his empire, became possessed of the beautiful Ozoro Ethifer, and commenced his reign with great glory.

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The nations which inhabited ancient Ethiopia have already been enumerated; and it is not to be supposed that all, or indeed any two of them, would agree in many respects. The ancient historians, however, give the following information. They had many laws which were very different from those of other nations; especially their laws relating to the election of kings. The priests chose the most reputable men of their body, and drew a large circle around them, which they were not to pass. A priest entered the circle, running and jumping like an Egyptian or a satyr. He of those that were included in the circle who first caught hold of the priest, was immediately declared king; and all the people paid him homage, as a person entrusted with the government of the nation by Divine Providence. The newly-elected king immediately began to live in the manner which was prescribed to him by the laws. In all things he exactly followed the customs of the country: he paid a most rigid attention to the rules established from the origin of the nation, in dispensing rewards and punishments. The king could not order a subject to be put to death, though he had been capitally convicted in a court of justice; but he sent an officer to him, who showed him the signal of death. The criminal then flung himself up in his house, and was his own executioner. It was not permitted him to fly to a neighbouring country, and submit to banishment for death; a relaxation of the rigour of the law, with which criminals were indigulged in Greece.

We have the following extraordinary information with regard to the death of many of their kings: The priests of Meroe, who had acquired great power there, when they thought proper, dispatched a courier to the king

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The Ethiopians kept the body a year in a niche on a pillar which they lined with silver. They placed the dead body in a niche placed in a pillar, and then placed silver statues in the niche. This was to honor the dead person and ensure their presence in the afterlife. The Ethiopians were known for their love of silver and their belief in the importance of honoring the dead.

Some Ethiopians believed in the afterlife and the importance of honoring the dead. They would keep the body in the niche for a year, and then place silver statues in the niche to honor the dead person. This was a common practice among the Ethiopians, and it showed their respect for the dead and their belief in the afterlife.
The savage Ethiopians of some districts gave their crown to him who of all their nation was best made. Their reason for that preference was, that the two first gifts of heaven were monarchy and a fine person. In other territories, they conferred the sovereignty on the most vigilant shepherd; for he, they alleged, would be the most careful guardian of his subjects. Others chose the richest man for their king; for he, they thought, would have it most in his power to do good to his subjects. Others, again, chose the strongest; effecting those most worthy of the first dignity who were ablest to defend them in battle.

The Jefuit missionaries were the first who gave any information to the Europeans concerning this country; and indeed, excepting them and the late accounts by Mr Bruce, we have no other source of information concerning it. The missionaries confirm what is said by the ancients, that Ethiopia is a very mountainous country. The provinces of Begemder, Gojam, Walaska, Shoar, &c. according to them, are only one continued chain of mountains. Many of them were said to be of such enormous height, that the Alps and Pyrenees are but mole-hills in comparison of them. Thofe called Aarni were said to be of this kind; but Mr Bruce informs us, that these accounts are greatly exaggerated. Amongst these mountains, and even frequently in the plains, there are many steep and craggy rocks to be met with of various and whimsical shapes; some of them so smooth, that men and oxen are craned up to the top by means of engines; but what is most surprising, the tops of these rocks are covered with woods and meadows, full of springs and streams of water; of the truth of which we have an attestation by Mr Bruce in his description of Lamlamon. The most remarkable of these, according to the authors we are now speaking of, is that called Amba Gfenien, mentioned in the course of this article as one of the mountains used for a prison to the princes of the blood. Its top is described as only half a league in breadth, though it is said that it would require near half a day to go round it. Kircher mentions also a rock which resembles a mirror at a distance; though this is probably not to be depended upon.

The climate of Ethiopia varies, as may naturally be supposed, according to the situation and elevation of the ground. On the coast of the Red Sea, as well as on the open flat parts of the country in general, the heat is intense, infomuch that at Susaken, an island in the Red Sea, Gregory the Abyssinian relates that it was so great, as to excoriate any part of the body exposed to the solar rays, melt hard feeling-wax, and wear a garment like red hot iron. In several districts, however, the heat is milder than in Portugal, and in Samen the air is rather cold than otherwise. In some other provinces the winter is very severe, though snow is seldom seen. Hall indeed sometimes falls, which resembles snow at a distance; and Mr Bruce mentions an account of snow having once fallen which lasted three days, and was looked upon to be a kind of prodigy. There are frequent and violent thunderers, with excessive deluges of rain during one part of the year, and there are likewise violent storms of wind. The missionaries mention a kind of wind named Seudo, which, according to Gregory, may be seen like a serpent of vast magnitude with its head on the ground, and the body twisted in vast curls up to the skies. This, in all probability, is no other than that violent species of whirlwind named Typhon, frequent in America and other warm countries; and its being visible is owing to the dust which it takes up in its passage.

Modern Ethiopia, or Abyssinia, as it is now called, Mr Bruce's is divided, according to Mr Bruce, into two parts, named Tigre and Ambara; though this rather denotes a difference in the language than in the territory of the people. The most westerly province properly so called is Maffiah. It is of considerable length, but no great breadth, running parallel to the Indian Ocean and Red Sea, in a zone of about 40 miles broad, as far as the island Massauh. The territories of the Baharnagahl include this province as well as the districts of Azab and Habab. In the former are mines of gold and salt, which in Abyssinia passes current instead of money. For this purpose the mineral is cut into square solid pieces about a foot in length. Here also is a kind of mint from which great profits are derived. The Habab is likewise called the land of the Agazzi or Shepherds; who speak the language called Geez, and have the use of letters from the most early ages. This province was formerly taken by the Turks, when the rebellions Baharnagahl Isacc called them to his assistance against the emperor Menas. From that time the office fell into disrepute, and the Baharnagahl at present has much less power than formerly. The province of Maffiah is now governed by a Mahometan prince or officer called a maybe.

Tigre is bounded on the east by the territories of the Baharnagahl, of which the river March is the boundary on the east, and the Taceazz on the west. It is about 200 miles long from north to south, and 120 broad from east to west. All the merchandise sent across the Red Sea to Abyssinia, or from Abyssinia across the Red Sea, must pass through this province, so that the governor makes his choice of it as it goes along. Thus the province itself is very wealthy; and as the Abyssinian fire-arms are brought from Arabia, the governors of Tigre, by purchasing quantities of them, may easily render themselves very powerful. No arms of this kind can be sent to any person without his permission; nor can any one buy till the governor has first had an offer.

Sire was some time ago united to Tigre, an account of the misbehaviour of its governor, but was disjoined from it at the time Mr Bruce was in Abyssinia, with the consent of Ras Michael, who belfoved the government of it upon his son. It is about 25 miles long, and as much in breadth. Its western boundary is the Taceazz.

Samen is a very mountainous province lying to the westward of the river Taceazz, about 80 miles long, and in some places 30 broad, though in most it is much narrower. It is mostly inhabited by Jews.

Begemder lies to the north-east of Tigre. It is about 180 miles long and 60 broad; bounded by the river Nile on the west. It comprehends the mountainous country of Laifa; and there are now several small governments diffiered from it. The inhabitants are fierce and barbarous, but reckoned the best soldiers in Abyssinia; and it is said that this province with Laifa can furnish 45,000 horsemen. It abounds with iron mines, which in Abyssinia would be very valuable if properly managed. It is also well flored with beautiful castle. Near the south end it is cut into vast gallys.
The governor of this country is one of the great officers of state; he has kettle-drums of silver, which he is allowed to bear through the streets of Gondar; a privilege allowed to none but himself. This privilege was conferred upon the first governor by David II. who conquered the country.

The frontier countries of Nara, Ras-el-Feel, Tchelga, &c. are wholly inhabited by Mahometsans, and the government of them is usually given to strangers. This country is very hot, unbelievably, and covered with thick woods. The people are fugitives from all nations; but excellent horsemen, making use of no other weapon but the broad sword; with which, however inadequate we might suppose the weapon to be, they will attack the elephant or rhinoceros.

The most distinct idea of the situation of the Abyssinian provinces is to be had from the map which Mr Bruce has given of it in his 5th volume. According to this, the empire is bounded on the north by a chain of mountains extending from very little interruption from 34° to 44° E. Long. and between 8° and 9° N. Lat. In the more prosperous times it extended beyond these southward, particularly into the kingdom of Adel; but the mountains just mentioned are undoubtedly to be reckoned its natural boundaries on this side. On the east and north-east it has the Red Sea, and on the south-east the kingdom of Adel. On the west and north its boundaries are less distinctly marked; having on both these quarters the barbarous kingdoms of Senaar, whose limits will no doubt be yet defined, and the kingdom of Adel; but the mountains just mentioned are undoubtedly to be reckoned its natural boundaries on this side. On the east and north-east it has the Red Sea, and on the south-east the kingdom of Adel. On the west and north its boundaries are less distinctly marked; having on both these quarters the barbarous

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The great difference of climate, owing to the vast extent and variety of elevation in different parts of this empire, is very perceptible in its foil and productions. The mountains in many places are not only barren, but altogether inaccessible, except by those who make it their constant practice to climb among them; and even by them they cannot be ascended without great difficulty and danger. The shape of these mountains, as we have already had occasion to observe, are very strange and fantastical; exceedingly different from those of Europe; some resembling towers and steeples, while others are like a board or flat jet up on end; the base being so narrow, and the whole mountain so high and thin, that it seems wonderful how it can stand. In the valleys, however, and flat parts of the country, the foil is excellently fruitful, though in the warmest places grain cannot be brought to perfection. Wine is also made only in one or two places; but the greatest production of fruits of all kinds is to be met with everywhere, as well as many vegetables not to be found in other countries. There is a vast variety of flowers, which adorn the banks of the rivers in such a manner as to make them resemble fine gardens. Among these a species of roses is met with, which grows upon trees, and is much superior in fragrance to those which grow on bushes. Senna, cardamon, ginger, and cotton, are likewise produced here in great quantities. Among the variety of rare plants to be met with in Abyssinia, Mr. Bruce particularly describes the following.

1. The papyrus, the ancient material for paper; which our author supposes to have been a native of Ethiopia, and not of Egypt as has been supposed. 2. Balefjan, balm, or balsam plant; a tree growing not only in the fuffern the beaches, or they are seen on the banks of a river named Bankfia. 3. The ergett, a species of the mimosa, is of two kinds; one called ergect y' dimono, or the bloody ergett, from the pink colour of its filaments; the other ergect el knone, or the horned ergett, with a flower resembling the acacia vera or Egyptian thorn. These were both found on the banks of a river named Amo, near the great lake Dembea. 4. Enite, an herbaceous plant, growing in Nara, in swampy places; but it is reputed to grow equally well in any other part of the empire where there is heat and moisture sufficient. It forms a great part of the vegetable food of the Abyssinians. It produces a kind of figs, but these are not eatable. When used for food, it is to be cut immediately above the small detached roots, or perhaps a foot or two higher, according to the age of the plant. The green is to be stripped from the upper part till it becomes white; and when soft, it affords an excellent food when eaten with milk or butter. 5. Kolquall, a kind of tree, only the lower part of which is woody, the upper part being herbaceous and succulent. The flowers are of a beautiful golden colour, and the fruit turns to a deep crimson; so that the trees make a very beautiful appearance. The whole plant is full of a very acid and caustic milk. 6. Rack is a large tree, growing not only in Abyssinia but in many places of Arabia Felix. Its wood is so hard and bitter, that no worm will touch it; for which reason it is used by the Arabs for constructing their boats. It grows, like the mangrove, among the salt-water of the sea, or about salt-springs. 7. Gir-gir, or gehe-it-eabbe; a kind of grass found about Ras-el-Feel, growing to the height of about three feet four inches. 8. The kanufr; a very noxious species of thorn, much more troublesome than any with which we are acquainted, and growing to the height of eight or more feet. The flowers have a strong smell like the flower magni- mont. 9. The gaggudi, a short tree only about nine feet high, a native of Lamalmon. The flowers, which are yellow and very beautiful, turn towards the sun like those of the helianthus. 10. The fawney, a tree common throughout all Abyssinia; flowers exactly on the first day the rains cease. It grows to the height of 19 or 20 feet; having a thick bark and close heavy wood; the first part of which is white, but the rest of a dark colour. The flowers are of a beautiful white colour; but it does not appear to possess any other remarkable property, though it is held in great estimation by the Abyssinians, and is even worshipped by the Galla. 12. The fafafa, or bahinia acuminate, grows in the country immediately adjacent to the fources of the Nile; being found by Mr Bruce scarce 400 yards distant from the fountain. 13. Kuara, is a beautiful tree, growing in the south and south-west parts of Abyssinia. It has a fruit like a bean, of a red colour, which in the early ages was made use of as a weight for gold and diamonds; and hence Mr Bruce is of opinion that the name of the imaginary weight, cited is derived. 14. The Walkfia, grows in the hottest parts of Ethiopia. It is a flowering tree, with beautiful white blossoms, which do not appear till towards the middle of January. The flowers have no smell, and are accounted pernicious to bees. The wood is very heavy. 15. The woogmoos, or Brugia antidy- fentica, is common throughout the whole empire, and principally on the sides of the valleys. It is a love- reign remedy against the dyentery, a very common and fatal disease in hot countries. Mr Bruce had experimental proof of its antidyentery virtues. 16. Cufso, or Bankia anthelmintica, is a very beautiful and useful tree, being a strong anthelmintic, and used as such by the Abyssinians. Every perfon there, whether male or female, is troubled with that kind of worm called afarides; a great number of which are evacuated every month, and the evacuation is promoted by an infusion of this plant. While taking this medicine, the patients medicate themselves from all their acquaintance, and keep close at home. It is said, that the want of this medicine in other countries is the reason why the Abyssinians do not go out of their own country; or, if they do, that they are short-lived. Teff, is a kind of grain found generally throughout Abyssinia; and constituting the bread commonly made use of by the inhabitants. They have indeed plenty of wheat, and are as skillful in forming it into bread as the Europeans; but this is only made use of by people of the first rank; however, the teff is sometimes of such an excellent quality, that the bread made from it is held in equal estimation with the finest wheat. From the bread made of this
Abytlinia abounds with a vast variety of quadrupeds both wild and tame. Immense numbers of cattle everywhere remain themselves, some of them the most beautiful in the world. Some have monstrous horns, fified to be capable of holding 10 quarts each; but this, as our author informs us, is a disease which proves fatal to them. Buffaloes are here met with in great numbers, and are very fierce and untractable: but there are no such animals as carnivorous bulls, which have been fabled to exist in this and other internal parts of Africa. Antelopes and other wild animals are met with in great numbers in the uncultivated parts; feeding chiefly on the leaves of trees. They abound most of all, however, in those parts which have been once cultivated, but since defolated by the calamities of war; and where wild oats abound in such quantities as to hide them from the pursuit of Hyenas, lions, foxes, jackals, wild boars, &c. are also found, as well as the elephant, rhinoceros, camels, and others of the larger and more uncommon kinds. Great havoc is made in the cultivated fields by multitudes of baboons, apes, rats, and mice. There is plenty of hares; but these being reckoned therewithal, they yellow part being filled with a kind of stomach, which in his 5th volume he calls the golden goose; or goos of the Nile, which is common all over Africa; but there are fpecies in all the marshes.

Our author describes very few fishes; though he says that an account of these, and other marine productions of the Red Sea which he has painted and collected, would occupy many large volumes, and the engraving cost a sum which he could not by any means afford. He mentions one named binnis, which is good food, and grows in a pretty large fize; that from which he took the drawing being about 32 pounds weight. Its whole body is covered with beautiful scales resembling silver spangles.

Of the reptiles in Abytlinia Mr Bruce describes the scorpion already mentioned as destructive to cattle, and which in his 5th volume he calls psalmalia. He gives few describing a particular description of a kind of lizard, and of the eel. He also speaks of eels and horned serpent; but denies that serpents are bytlinia, as almost all authors have supposed, and as we should be led naturally to suppose.
Manners, &c. of the Abyssinians.

403 Method of settling the succession to the crown detrimental to the empire.

404 Excessive destruction by the Abyssinian armies.

405 Immeasurable number of birds which follow them.

406 Curious method of keeping off the hyænas from the king's palace.

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From these and other circumstances we should be apt to imagine that the Abyssinians, instead of becoming more civilized, were daily improving in barbarity. The king is anointed at his election with plain oil of olives; "which (says Mr Bruce) being poured upon the crown of his head, he rubs into his long hair indecently enough with both his hands, pretty much as his soldiers do with theirs when they get access to plenty of butter." In former times, however, matters seem to have been conducted with more decency. Solomon, the greatest monarch that ever sat on the Abyssinian throne, was crowned, after having gained a great victory over the Galla, in a very different manner, and with the ceremonies which we are told were in use among the ancient kings of Tigre. At that time he had with him an army of about 30,000 men; and was besides attended by all the great officers dressed in the gayest manner, as well as by the ladies of the first quality in the empire. The king himself, dressed in crimson damask, with a great chain of gold about his neck, his head bare, and mounted on a horse richly caparisoned, advanced at the head of his nobility, pulled the outer court, and came to the paved way before the church. Here he was met by a number of young girls, daughters of the Umbares or supreme judges, together with many noble virgins standing on the right and left of the court. Two of the noblesse of these held in their hands a crimson cord of silk, somewhat thicker than common whip-cord, stretched across from one company to another, as if to shut up the road by which the king was approaching the church. When this cord was prepared and drawn tight about breast-high by the girls, the king entered; advancing moderately quick, and showing his skill in horsemanship as he went along. Being stopped by the tenon of the singing, the damseis asked, Who was he? To this he answered, "I am your king, the king of Ethiopia." But they replied, "You shall not pass; you are not our king." He then retired some paces, and again presented himself. The question was again put, "Who he was?" To which he answered, "I am your king, the king of Israel." But the same reply was still given by the girls. The third time, on being asked, "Who he was?" he answered, "I am your king the king of Tigré;" and drawing his sword, he cut the cord asunder. The damseis then cried out, "It is a truth, you are our king; truly you are the king of Tigré." On this they began to sing Hallelujah, and were joined by the whole army and the rest of the king's attendants. Amidst these acclamations the king advanced to the foot of the stair of the church, dismounted, and sat down upon a stone, which, in Mr Bruce's opinion, was plainly an altar of Aumbs or the Dog-star. After the king, came a number of priests in proper order. The king was first anointed, then crowned, and accompanied half up the steps by the singing priests. He stepped at a hole made on purpose in one of the steps, where he was fumigated with myrrh, aloes, and calamus; after which divine service was celebrated, and he returned to the camp, where 14 days were spent in feasting and rejoicing with the ceremonies of this kind afterwards given over on account of the expense. Our author was informed by Tecla Haimanout, that when he was obliged to retire into Tigre from his enemies, Ras Michael had some thoughts
thoughts of having him crowned in contempt of his enemies; but by the most moderate calculation that could be made, it would have cost 20,000 ounces of gold, about 80,000 l. sterling; on which all thoughts of it were laid aside.

With regard to the manners of the Abyssinians, they are represented by Mr. Bruce as highly barbarous. Their continual warfare impels them to blood from their infancy; so that even children would not have the least scruple at killing one another or grown up persons if they were able. Many shocking instances of hardness of heart are related by our author in Tecla Haimanout himself, though otherwise an accomplished prince. Their cruelty displays itself abundantly in the punishments inflicted upon criminals, one of which is flagellating, as has been already related of Woofheka. Cutting in pieces with a knife is another, and this is performed, not by executioners, whose employment is reckoned disgraceful as in this country, but by officers and people of quality. So little is this thought of in Gondar, the capital of the empire, that Mr Bruce happening to pass by an officer employed in this work, who had three men to dispatch, the officer called to him to stop till he had killed them all, as he wanted to speak to him upon a matter of consequence. Stoning to death is a capital punishment; likewise common in this country; and publicly inflicted on Roman Catholics if they happen to be found, or upon other heretics in religion.

It is not to be supposed that people who regard the lives of one another so little, will show much compassion to the brute creation. In this respect, however, the Abyssinians are cruel and savage beyond all people on the face of the earth. There are many instances of people eating raw fish or flesh, and we call them barbarous that do so; but what name shall we give to those who cut off pieces of flesh from animals while still living, and eat it not only raw but still quivering with life! Mr Bruce labours much to prove, that the way of eating not raw, but living flesh was customary among the nations of antiquity; but whatever be in this, he is the only author who mentions it directly; and it is on his single testimony that the fact is established. The Jesuits mentioned in their books the Abyssinians eat raw flesh, but not a word of eating it in this manner; and indeed there are some circumstances which he himself relates seemingly very difficult to be reconciled with known indubitable facts. He informs us, for instance, that when at no great distance from Axum, the capital of Tigre, he fell in with three soldiers "driving a cow. They halted at a brook, threw down the beast, and one of them cut a pretty large collop of flesh from its buttock; after which they drove the cow gently on as before." In another place he tells us, that the flesh was taken from the upper part of the buttock, that the skin was flapped over the wound, fastened with a skewer, and a cataplasm of clay put over all. Now, it is known to anatomists, that no piece of flesh can be cut off without destroying a muscle; and that the muscles of the buttocks are subservient to the motion of the legs. The Abyssinians therefore must have been expert anatomists to know how to cut off such muscles as would allow the creature still to go on; and if their repast had been two or three times repeated, it is plainly impossible that the cow could at any rate have stirred a step. In his description of their feasts there is more profanity; for there the animal is tied so that it cannot move; after stripping off the skin, the flesh of the buttocks is cut off in solid square pieces, without bones or much effusion of blood; and the prodigious noise the animal makes is a signal for the company to sit down to table. Every man sits between two women, having a long knife in his hand. With this he cuts the flesh, while the motion of its fibres is yet visible, into pieces like dice. These are laid upon pieces of bread made of the grain called teff; already mentioned, after being strongly powdered with Cayenne pepper and mustard salt. They are then rolled up like as many cartridges; the men open their mouths, flapping and gaping like idiots, while the women cram them so full of these cartridges, that they seem every moment in danger of being choked; and in proportion to the quantity their mouths can hold, and the noise they make in chewing, they are held in estimation by the company. All this time the animal bleeds but little; but when the large arteries are cut and it expires, the flesh becomes tough; and the wretches who have the rest to eat, gnaw it from the bones like dogs.